ALG axioms

ALG001-0.ax Abstract algebra axioms, based on Godel set theory
(associative(xs, xf) and $x \in$ xs and $y \in$ xs and $z \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, apply_to_two_arguments(xf, x, y), z) =
apply_to_two_arguments(xf, x, apply_to_two_arguments(xf, y, z)) cnf(associative_system$_1$, axiom)
associative(xs, xf) or f_{34}(xs, xf) $\in$ xs cnf(associative_system$_2$, axiom)
associative(xs, xf) or f_{35}(xs, xf) $\in$ xs cnf(associative_system$_3$, axiom)
associative(xs, xf) or f_{36}(xs, xf) $\in$ xs cnf(associative_system$_4$, axiom)
apply_to_two_arguments(xf, apply_to_two_arguments(xf, f_{34}(xs, xf), f_{35}(xs, xf)), f_{36}(xs, xf)) = apply_to_two_arguments(xf, f_{34}(x
associative(xs, xf) cnf(associative_system$_5$, axiom)
identity(xs, xf, xe) $\Rightarrow$ xe $\in$ xs cnf(identity$_1$, axiom)
(identity(xs, xf, xe) and $x \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, xe, x) = x cnf(identity$_2$, axiom)
(identity(xs, xf, xe) and $x \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, x, xe) = x cnf(identity$_3$, axiom)
xe $\in$ xs $\Rightarrow$ (identity(xs, xf, xe) or f_{37}(xs, xf, xe) $\in$ xs) cnf(identity$_4$, axiom)
(xe $\in$ xs and apply_to_two_arguments(xf, xe, f_{37}(xs, xf, xe)) = f_{37}(xs, xf, xe) and apply_to_two_arguments(xf, f_{37}(xs, xf, xe), xe)
f_{37}(xs, xf, xe)) $\Rightarrow$ identity(xs, xf, xe) cnf(identity$_5$, axiom)
xs$'$ $\Rightarrow$ maps(xg, xs, xs) cnf(inverse$_1$, axiom)
(xs$'$ and $x \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, apply(xg, x), x) = xe cnf(inverse$_2$, axiom)
(xs$'$ and $x \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, x, apply(xg, x)) = xe cnf(inverse$_3$, axiom)
maps(xg, xs, xs) $\Rightarrow$ (xs$'$ or f_{38}(xs, xf, xe, xg) $\in$ xs) cnf(inverse$_4$, axiom)
(maps(xg, xs, xs) and apply_to_two_arguments(xf, apply(xg, f_{38}(xs, xf, xe, xg)), f_{38}(xs, xf, xe, xg)) = xe and apply_to_two_argu
xe) $\Rightarrow$ xs$'$ cnf(inverse$_5$, axiom)
group(xs, xf) $\Rightarrow$ closed(xs, xf) cnf(group$_1$, axiom)
group(xs, xf) $\Rightarrow$ associative(xs, xf) cnf(group$_2$, axiom)
group(xs, xf) $\Rightarrow$ identity(xs, xf, f_{39}(xs, xf)) cnf(group$_3$, axiom)
group(xs, xf) $\Rightarrow$ xs$'$ cnf(group$_4$, axiom)
(closed(xs, xf) and associative(xs, xf) and identity(xs, xf, xe) and xs$'$) $\Rightarrow$ group(xs, xf) cnf(group$_5$, axiom)
(commutes(xs, xf) and $x \in$ xs and $y \in$ xs) $\Rightarrow$ apply_to_two_arguments(xf, x, y) = apply_to_two_arguments(xf, y, x) cnf(co
commutes(xs, xf) or f_{41}(xs, xf) $\in$ xs cnf(commutes$_2$, axiom)
commutes(xs, xf) or f_{42}(xs, xf) $\in$ xs cnf(commutes$_3$, axiom)
apply_to_two_arguments(xf, f_{41}(xs, xf), f_{42}(xs, xf)) = apply_to_two_arguments(xf, f_{42}(xs, xf), f_{41}(xs, xf)) $\Rightarrow$ commutes(xs, xf)

ALG002+0.ax Median algebra axioms
$\forall x, y$: $f(x, x, y) = x$ fof(majority, axiom)
$\forall x, y, z$: $f(x, y, z) = f(z, x, y)$ fof(permute$_1$, axiom)
$\forall x, y, z$: $f(x, y, z) = f(x, z, y)$ fof(permute$_2$, axiom)
$\forall w, x, y, z$: $f(f(x, w, y), w, z) = f(x, w, f(y, w, z))$ fof(associativity, axiom)

ALG problems

ALG001-1.p The composition of homomorphisms is a homomorphism
include('Axioms/SET003-0.ax')
(little_set(x) and little_set(u) and ordered_pair(x, y) = ordered_pair(u, v)) $\Rightarrow$ $x = u$ cnf(first_components_are_equal, axio
(little_set(x) and little_set(y) and non_ordered_pair(z, x) = non_ordered_pair(z, y)) $\Rightarrow$ $x = y$ cnf(left_cancellation, axiom)
(little_set(x) and little_set(y) and little_set(u) and little_set(v) and ordered_pair(x, y) = ordered_pair(u, v)) $\Rightarrow$ $y =$
v cnf(second_components_are_equal, axiom)
($x \subseteq y$ and $y \subseteq x$) $\Rightarrow$ $x = y$ cnf(two_sets_equal, axiom)
(little_set(x) and little_set(y)) $\Rightarrow$ first(ordered_pair(x, y)) = x cnf(property_of_first, axiom)
(little_set(x) and little_set(y)) $\Rightarrow$ second(ordered_pair(x, y)) = y cnf(property_of_second, axiom)
ordered_pair_predicate(x) $\Rightarrow$ little_set(first(x)) cnf(first_component_is_small, axiom)
ordered_pair_predicate(x) $\Rightarrow$ little_set(second(x)) cnf(second_component_is_small, axiom)
little_set(x) $\Rightarrow$ $x \in$ singleton_set(x) cnf(property_of_singleton_sets, axiom)
little_set(ordered_pair(x, y)) cnf(ordered_pairs_are_small$_1$, axiom)
ordered_pair_predicate(x) $\Rightarrow$ little_set(x) cnf(ordered_pairs_are_small$_2$, axiom)
($x \subseteq y$ and $y \subseteq z$) $\Rightarrow$ $x \subseteq z$ cnf(containment_is_transitive, axiom)
apply(xf, y) $\subseteq$ sigma(image(singleton_set(y), xf)) cnf(image_and_apply$_1$, axiom)
image(singleton_set(y), xf) $\subseteq$ apply(xf, y) cnf(image_and_apply$_2$, axiom)
function(y) $\Rightarrow$ little_set(apply(y, x)) cnf(function_values_are_small, axiom)
relation($y \circ x$) cnf(composition_is_a_relation, axiom)

$\mathrm{range\_of}(y \circ x) \subseteq \mathrm{range\_of}(y)$ cnf(range_of_composition, axiom)
$\mathrm{range\_of}(x) \subseteq \mathrm{domain\_of}(y) \Rightarrow \mathrm{domain\_of}(x) = \mathrm{domain\_of}(y \circ x)$ cnf(domain_of_composition, axiom)
$(\mathrm{function}(x) \text{ and } \mathrm{function}(y)) \Rightarrow \mathrm{function}(y \circ x)$ cnf(composition_is_a_function, axiom)
$(\mathrm{maps}(\mathrm{xf}, u, v) \text{ and } \mathrm{maps}(\mathrm{xg}, v, w)) \Rightarrow \mathrm{maps}(\mathrm{xg} \circ \mathrm{xf}, u, w)$ cnf(maps_for_composition, axiom)
$(\mathrm{little\_set}(x) \text{ and } \mathrm{little\_set}(y) \text{ and } \mathrm{function}(\mathrm{xf}) \text{ and } \mathrm{ordered\_pair}(x, y) \in \mathrm{xf}) \Rightarrow \mathrm{apply}(\mathrm{xf}, x) = y$ cnf(apply_for_functions$_1$,
$(\mathrm{function}(\mathrm{xf}) \text{ and } x \in \mathrm{domain\_of}(\mathrm{xf}) \text{ and } \mathrm{apply}(\mathrm{xf}, x) = y) \Rightarrow \mathrm{ordered\_pair}(x, y) \in \mathrm{xf}$ cnf(apply_for_functions$_2$, axiom)
$(\mathrm{maps}(\mathrm{xf}, \mathrm{xd}, \mathrm{xr}) \text{ and } x \in \mathrm{xd}) \Rightarrow \mathrm{apply}(\mathrm{xf}, x) \in \mathrm{xr}$ cnf(apply_for_functions$_3$, axiom)
$(\mathrm{function}(\mathrm{xf}) \text{ and } x \in \mathrm{domain\_of}(\mathrm{xf})) \Rightarrow \mathrm{apply}(\mathrm{xg}, \mathrm{apply}(\mathrm{xf}, x)) \subseteq \mathrm{apply}(\mathrm{xg} \circ \mathrm{xf}, x)$ cnf(apply_for_composition$_1$, axiom)
$\mathrm{function}(\mathrm{xf}) \Rightarrow \mathrm{apply}(\mathrm{xg} \circ \mathrm{xf}, x) \subseteq \mathrm{apply}(\mathrm{xg}, \mathrm{apply}(\mathrm{xf}, x))$ cnf(apply_for_composition$_2$, axiom)
$(\mathrm{function}(\mathrm{xf}) \text{ and } x \in \mathrm{domain\_of}(\mathrm{xf})) \Rightarrow \mathrm{apply}(\mathrm{xg}, \mathrm{apply}(\mathrm{xf}, x)) = \mathrm{apply}(\mathrm{xg} \circ \mathrm{xf}, x)$ cnf(apply_for_composition$_3$, axiom)
$(x \in \mathrm{xs}_1 \text{ and } y \in \mathrm{xs}_2) \Rightarrow \mathrm{ordered\_pair}(x, y) \in \mathrm{cross\_product}(\mathrm{xs}_1, \mathrm{xs}_2)$ cnf(ordered_pair_in_cross_product, axiom)
$\mathrm{homomorphism}(f_{60}, f_{62}, f_{63}, f_{64}, f_{65})$ cnf(one_homomorphism, hypothesis)
$\mathrm{homomorphism}(f_{61}, f_{64}, f_{65}, f_{66}, f_{67})$ cnf(another_homomorphism, hypothesis)
$\neg\, \mathrm{homomorphism}(f_{60} \circ f_{61}, f_{62}, f_{63}, f_{66}, f_{67})$ cnf(prove_composition_is_a_homomorphism, negated_conjecture)

ALG001-2.p The composition of homomorphisms is a homomorphism
include('Axioms/SET003-0.ax')
$\mathrm{homomorphism}(f_{60}, f_{62}, f_{63}, f_{64}, f_{65})$ cnf(one_homomorphism, hypothesis)
$\mathrm{homomorphism}(f_{61}, f_{64}, f_{65}, f_{66}, f_{67})$ cnf(another_homomorphism, hypothesis)
$\neg\, \mathrm{homomorphism}(f_{60} \circ f_{61}, f_{62}, f_{63}, f_{66}, f_{67})$ cnf(prove_composition_is_a_homomorphism, negated_conjecture)

ALG001-3.p The composition of homomorphisms is a homomorphism
include('Axioms/SET004-0.ax')
include('Axioms/SET004-1.ax')
$\mathrm{homomorphism}(\mathrm{xh}_1, \mathrm{xf}_1, \mathrm{xf}_2)$ cnf(prove_composition_of_homomorphisms$_1$, negated_conjecture)
$\mathrm{homomorphism}(\mathrm{xh}_2, \mathrm{xf}_2, \mathrm{xf}_3)$ cnf(prove_composition_of_homomorphisms$_2$, negated_conjecture)
$\neg\, \mathrm{homomorphism}(\mathrm{xh}_2 \circ \mathrm{xh}_1, \mathrm{xf}_1, \mathrm{xf}_3)$ cnf(prove_composition_of_homomorphisms$_3$, negated_conjecture)

ALG001∧5.p TPS problem THM133
The composition of homomorphisms of binary operators is a homomorphisms. Boyer et al JAR 2 page 284.
g: \$tType thf(g_type, type)
b: \$tType thf(b_type, type)
a: \$tType thf(a_type, type)
$\forall \mathrm{xh}_1\colon g \to b, \mathrm{xh}_2\colon b \to a, \mathrm{xf}_1\colon g \to g \to g, \mathrm{xf}_2\colon b \to b \to b, \mathrm{xf}_3\colon a \to a \to a\colon ((\forall \mathrm{xx}\colon g, \mathrm{xy}\colon g\colon (\mathrm{xh}_1@(\mathrm{xf}_1@\mathrm{xx}@\mathrm{xy})) =$
$(\mathrm{xf}_2@(\mathrm{xh}_1@\mathrm{xx})@(\mathrm{xh}_1@\mathrm{xy})) \text{ and } \forall \mathrm{xx}\colon b, \mathrm{xy}\colon b\colon (\mathrm{xh}_2@(\mathrm{xf}_2@\mathrm{xx}@\mathrm{xy})) = (\mathrm{xf}_3@(\mathrm{xh}_2@\mathrm{xx})@(\mathrm{xh}_2@\mathrm{xy}))) \Rightarrow \forall \mathrm{xx}\colon g, \mathrm{xy}\colon g\colon (\mathrm{xh}_2@(\mathrm{xh}$
$(\mathrm{xf}_3@(\mathrm{xh}_2@(\mathrm{xh}_1@\mathrm{xx}))@(\mathrm{xh}_2@(\mathrm{xh}_1@\mathrm{xy}))))$ thf(cTHM133_pme, conjecture)

ALG002-1.p In an ordered field, if X > 0 then X∧-1 > 0
$x \cdot 1{=}x$ cnf(right_identity, axiom)
$\neg\, 1 \cdot 1{=}0$ cnf(not_abelian, axiom)
$x \cdot y{=}z \Rightarrow (-x) \cdot (-y){=}z$ cnf(product_of_inverses$_1$, axiom)
$(-x) \cdot (-y){=}z \Rightarrow x \cdot y{=}z$ cnf(product_of_inverses$_2$, axiom)
$x \cdot y{=}z \Rightarrow x \cdot (-y){=}-z$ cnf(product_to_inverse, axiom)
$x \cdot x^{-1}{=}1 \text{ or } x \cdot x{=}0$ cnf(inverse_and_identity, axiom)
$\mathrm{greater\_than}_0(x) \Rightarrow \neg\, \mathrm{greater\_than}_0(-x)$ cnf(inverse_greater_than$_0$, axiom)
$\mathrm{greater\_than}_0(x) \Rightarrow \neg\, x \cdot x{=}0$ cnf(greater_than_0_square, axiom)
$x \cdot y{=}z \Rightarrow y \cdot x{=}z$ cnf(commutativity_of_product, axiom)
$\mathrm{greater\_than}_0(x) \text{ or } x \cdot x{=}0 \text{ or } \mathrm{greater\_than}_0(-x)$ cnf(product_and_inverse, axiom)
$(y \cdot z{=}x \text{ and } y \cdot y{=}0) \Rightarrow x \cdot x{=}0$ cnf(square_to$_0$, axiom)
$(y \cdot z{=}x \text{ and } \mathrm{greater\_than}_0(y) \text{ and } \mathrm{greater\_than}_0(z)) \Rightarrow \mathrm{greater\_than}_0(x)$ cnf(product_and_greater_than$_0$, axiom)
$\mathrm{greater\_than}_0(a)$ cnf(a_greater_than$_0$, hypothesis)
$\neg\, \mathrm{greater\_than}_0(a^{-1})$ cnf(prove_a_inverse_greater_than$_0$, negated_conjecture)

ALG003-1.p Cancellative medial algebras
We prove a property of cancellative medial algebras.
$(x \cdot y = z \text{ and } u \cdot y = z) \Rightarrow x = u$ cnf(left_cancellation, axiom)
$(x \cdot y = z \text{ and } x \cdot u = z) \Rightarrow y = u$ cnf(right_cancellation, axiom)
$(x \cdot y) \cdot (z \cdot u) = (x \cdot z) \cdot (y \cdot u)$ cnf(medial_law, axiom)
$\mathrm{an\_element} \cdot \mathrm{an\_element} = \mathrm{an\_element}$ cnf(idempotent_element, hypothesis)
$(a \cdot (d \cdot c)) \cdot ((b \cdot e) \cdot f) \neq (a \cdot (b \cdot c)) \cdot ((d \cdot e) \cdot f)$ cnf(prove_this, negated_conjecture)

ALG004-1.p Cancellative medial algebras satisfy the quotient condition.
$(x \cdot y = z \text{ and } u \cdot y = z) \Rightarrow x = u$ cnf(left_cancellation, axiom)

$(x \cdot y = z \text{ and } x \cdot u = z) \Rightarrow y = u$ cnf(right_cancelaation, axiom)
$(x \cdot y) \cdot (z \cdot u) = (x \cdot z) \cdot (y \cdot u)$ cnf(medial_law, axiom)
$b \cdot b_0 = a \cdot a_0$ cnf(prove_quotient_condition$_1$, negated_conjecture)
$d \cdot b_0 = c \cdot a_0$ cnf(prove_quotient_condition$_2$, negated_conjecture)
$b \cdot d_0 = a \cdot c_0$ cnf(prove_quotient_condition$_3$, negated_conjecture)
$d \cdot d_0 \neq c \cdot c_0$ cnf(prove_quotient_condition$_4$, negated_conjecture)

ALG005-1.p Associativity of intersection in terms of set difference.
Starting with Kalman's basis for families of sets closed under set difference, we define intersection and show it to be associative.
$x \setminus (y \setminus x) = x$ cnf(set_difference$_1$, axiom)
$x \setminus (x \setminus y) = y \setminus (y \setminus x)$ cnf(set_difference$_2$, axiom)
$(x \setminus y) \setminus z = (x \setminus z) \setminus (y \setminus z)$ cnf(set_difference$_3$, axiom)
$x \cdot y = x \setminus (x \setminus y)$ cnf(intersection, axiom)
$(a \cdot b) \cdot c \neq a \cdot (b \cdot c)$ cnf(prove_associativity_of_multiply, negated_conjecture)

ALG006-1.p Simplification of Kalman's set difference basis (part 1)
This is part 1 of a proof that one of the axioms in Kalman's basis for set difference can be simplified.
$x \setminus (y \setminus x) = x$ cnf(set_difference$_1$, axiom)
$x \setminus (x \setminus y) = y \setminus (y \setminus x)$ cnf(set_difference$_2$, axiom)
$(x \setminus y) \setminus z = (x \setminus z) \setminus (y \setminus z)$ cnf(set_difference$_3$, axiom)
$(a \setminus c) \setminus b \neq (a \setminus b) \setminus c$ cnf(prove_set_difference_3_simplified, negated_conjecture)

ALG007-1.p Simplification of Kalman's set difference basis (part 2)
This is part 2 of a proof that one of the axioms in Kalman's basis for set difference can be simplified.
$x \setminus (y \setminus x) = x$ cnf(set_difference$_1$, axiom)
$x \setminus (x \setminus y) = y \setminus (y \setminus x)$ cnf(set_difference$_2$, axiom)
$(x \setminus y) \setminus z = (x \setminus z) \setminus y$ cnf(set_difference_3_simplified, axiom)
$(a \setminus b) \setminus c \neq (a \setminus c) \setminus (b \setminus c)$ cnf(prove_set_difference$_3$, negated_conjecture)

ALG008-1.p TC + right identity does not give RC.
An algebra with a right identity satisfying the Thomsen Closure (RC) condition does not necessarily satisfy the Reidemeister Closure (RC) condition.
$(x \cdot y = z \text{ and } u \cdot v = z \text{ and } x \cdot w = v_6 \text{ and } v_7 \cdot v = v_6) \Rightarrow u \cdot w = v_7 \cdot y$ cnf(thomsen_closure, axiom)
$x \cdot \text{identity} = x$ cnf(right_identity, axiom)
$c_4 \cdot a = c_3 \cdot b$ cnf(prove_reidimeister$_1$, negated_conjecture)
$c_2 \cdot a = c_1 \cdot b$ cnf(prove_reidimeister$_2$, negated_conjecture)
$c_4 \cdot f = c_3 \cdot \text{identity}$ cnf(prove_reidimeister$_3$, negated_conjecture)
$c_2 \cdot f \neq c_1 \cdot \text{identity}$ cnf(prove_reidimeister$_4$, negated_conjecture)

ALG009-1.p Abstract algebra axioms, based on Godel set theory
include('Axioms/ALG001-0.ax')
include('Axioms/SET003-0.ax')

ALG010-1.p Prove J follows from HBCK
Axioms for the quasivariety HBCK are given below. Show that equation J follows.
$a \cdot 1 = 1$ cnf(m_3, axiom)
$1 \cdot a = a$ cnf(m_4, axiom)
$(a \cdot b) \cdot ((c \cdot a) \cdot (c \cdot b)) = 1$ cnf(m_5, axiom)
$(a \cdot b = 1 \text{ and } b \cdot a = 1) \Rightarrow a = b$ cnf(m_7, axiom)
$a \cdot a = 1$ cnf(m_8, axiom)
$a \cdot (b \cdot c) = b \cdot (a \cdot c)$ cnf(m_9, axiom)
$(a \cdot b) \cdot (a \cdot c) = (b \cdot a) \cdot (b \cdot c)$ cnf(h, axiom)
$(((a \cdot b) \cdot b) \cdot a) \cdot a \neq (((b \cdot a) \cdot a) \cdot b) \cdot b$ cnf(prove_j, negated_conjecture)

ALG011-1.p Partition a monoid into 2 partitions
If C,D is a partition of a monoid M, we cannot have C * C subset D and D * D subset C.
$f(x, f(y, z)) = f(f(x, y), z)$ cnf(f_is_associative, axiom)
$c(x) \text{ or } d(x)$ cnf(partitions_union, axiom)
$c(x) \Rightarrow \neg d(x)$ cnf(partitions_exclusive, hypothesis)
$c(a_1)$ cnf(partition_c_not_empty, hypothesis)
$d(a_2)$ cnf(partition_d_not_empty, hypothesis)
$(c(x) \text{ and } c(y)) \Rightarrow d(f(x, y))$ cnf(conjecture$_1$, negated_conjecture)

$(d(x) \text{ and } d(y)) \Rightarrow c(f(x,y))$ cnf(conjecture$_2$, negated_conjecture)

ALG012-1.p Partition a monoid into 3 partitions
If C,D1,D2 is a partition of a monoid M, we cannot have C * C subset D1 u D2 and Dj * Dj subset C.
$f(x, f(y,z)) = f(f(x,y),z)$ cnf(f_is_associative, axiom)
$c(x)$ or $d_1(x)$ or $d_2(x)$ cnf(partitions_union, axiom)
$c(x) \Rightarrow \neg d_1(x)$ cnf(partitions_exclusive_c_d$_1$, hypothesis)
$c(x) \Rightarrow \neg d_2(x)$ cnf(partitions_exclusive_c_d$_2$, hypothesis)
$d_1(x) \Rightarrow \neg d_2(x)$ cnf(partitions_exclusive_d1_d$_2$, hypothesis)
$c(a_1)$ cnf(partition_c_not_empty, hypothesis)
$d_1(a_2)$ cnf(partition_d1_not_empty, hypothesis)
$d_2(a_3)$ cnf(partition_d2_not_empty, hypothesis)
$(c(x) \text{ and } c(y)) \Rightarrow (d_2(f(x,y)) \text{ or } d_1(f(x,y)))$ cnf(conjecture$_1$, negated_conjecture)
$(d_1(x) \text{ and } d_1(y)) \Rightarrow c(f(x,y))$ cnf(conjecture$_2$, negated_conjecture)
$(d_2(x) \text{ and } d_2(y)) \Rightarrow c(f(x,y))$ cnf(conjecture$_3$, negated_conjecture)

ALG013-1.p Partition a monoid into 4 partitions
If C1,C2,D1,D2 is a partition of a monoid M, we cannot have Ci * Ci subset D1 u D2 and Dj * Dj subset C1 u C2.
$f(x, f(y,z)) = f(f(x,y),z)$ cnf(f_is_associative, axiom)
$c_2(x)$ or $c_1(x)$ or $d_1(x)$ or $d_2(x)$ cnf(partitions_union, axiom)
$c_1(x) \Rightarrow \neg c_2(x)$ cnf(partitions_exclusive_c1_c$_2$, hypothesis)
$c_1(x) \Rightarrow \neg d_1(x)$ cnf(partitions_exclusive_c1_d$_1$, hypothesis)
$c_1(x) \Rightarrow \neg d_2(x)$ cnf(partitions_exclusive_c1_d$_2$, hypothesis)
$c_2(x) \Rightarrow \neg d_1(x)$ cnf(partitions_exclusive_c2_d$_1$, hypothesis)
$c_2(x) \Rightarrow \neg d_2(x)$ cnf(partitions_exclusive_c2_d$_2$, hypothesis)
$d_1(x) \Rightarrow \neg d_2(x)$ cnf(partitions_exclusive_d1_d$_2$, hypothesis)
$c_1(a_1)$ cnf(partition_c1_not_empty, hypothesis)
$c_2(a_2)$ cnf(partition_c2_not_empty, hypothesis)
$d_1(a_3)$ cnf(partition_d1_not_empty, hypothesis)
$d_2(a_4)$ cnf(partition_d2_not_empty, hypothesis)
$(c_1(x) \text{ and } c_1(y)) \Rightarrow (d_2(f(x,y)) \text{ or } d_1(f(x,y)))$ cnf(conjecture$_1$, negated_conjecture)
$(c_2(x) \text{ and } c_2(y)) \Rightarrow (d_2(f(x,y)) \text{ or } d_1(f(x,y)))$ cnf(conjecture$_2$, negated_conjecture)
$(d_1(x) \text{ and } d_1(y)) \Rightarrow (c_2(f(x,y)) \text{ or } c_1(f(x,y)))$ cnf(conjecture$_3$, negated_conjecture)
$(d_2(x) \text{ and } d_2(y)) \Rightarrow (c_2(f(x,y)) \text{ or } c_1(f(x,y)))$ cnf(conjecture$_4$, negated_conjecture)

ALG018+1.p Groups 4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\text{sorti}_1(u) \text{ and } \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(v,v) = u))$ fof(ax$_3$, axiom)
$\neg \exists u\colon (\text{sorti}_2(u) \text{ and } \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(v,v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u))) \text{ and } \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG019+1.p Groups 4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\neg \exists u\colon (\text{sorti}_1(u) \text{ and } \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(v,v) = u))$ fof(ax$_3$, axiom)
$\neg \neg \exists u\colon (\text{sorti}_2(u) \text{ and } \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(v,v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u))) \text{ and } \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG029+1.p Groups 6: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(u,v) = \text{op}_1(v,u)))$ fof(ax$_3$, axiom)
$\neg \forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(u,v) = \text{op}_2(v,u)))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u))) \text{ and } \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG030+1.p Groups 6: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2

$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\neg \forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(u,v) = \text{op}_1(v,u)))$ fof(ax$_3$, axiom)
$\neg \neg \forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(u,v) = \text{op}_2(v,u)))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG040+1.p Loops 4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\text{sorti}_1(u)$ and $\forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(v,v) = u))$ fof(ax$_3$, axiom)
$\neg \exists u\colon (\text{sorti}_2(u)$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(v,v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG041+1.p Loops 4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\neg \exists u\colon (\text{sorti}_1(u)$ and $\forall v\colon (\text{sorti}_1(v) \Rightarrow \text{op}_1(v,v) = u))$ fof(ax$_3$, axiom)
$\neg \neg \exists u\colon (\text{sorti}_2(u)$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{op}_2(v,v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG069+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \exists v\colon (\text{sorti}_1(v)$ and $\text{op}_1(v,v) = u))$ fof(ax$_3$, axiom)
$\neg \forall u\colon (\text{sorti}_2(u) \Rightarrow \exists v\colon (\text{sorti}_2(v)$ and $\text{op}_2(v,v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG070+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow (\text{op}_1(u,u) \neq v$ or $\text{op}_1(u,v) = u)))$ fof(ax$_3$, axiom)
$\neg \forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow (\text{op}_2(u,u) \neq v$ or $\text{op}_2(u,v) = u)))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG071+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-3
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \exists v\colon (\text{sorti}_1(v)$ and $\text{op}_1(v,\text{op}_1(v,u)) \neq u$ and $\text{op}_1(u,\text{op}_1(v,u)) = v))$ fof(ax$_3$, axiom)
$\neg \forall u\colon (\text{sorti}_2(u) \Rightarrow \exists v\colon (\text{sorti}_2(v)$ and $\text{op}_2(v,\text{op}_2(v,u)) \neq u$ and $\text{op}_2(u,\text{op}_2(v,u)) = v))$ fof(ax$_4$, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg \forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w),h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y),j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG072+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-4
$\text{sorti}_1(\text{unit}_1)$ fof(ax$_1$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow (\text{op}_1(\text{unit}_1,u) = u$ and $\text{op}_1(u,\text{unit}_1) = u))$ and $\exists v\colon (\text{sorti}_1(v)$ and $\text{unit}_1 = v)$ fof(ax$_2$, axiom)
$\text{sorti}_2(\text{unit}_2)$ fof(ax$_3$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow (\text{op}_2(\text{unit}_2,u) = u$ and $\text{op}_2(u,\text{unit}_2) = u))$ and $\exists v\colon (\text{sorti}_2(v)$ and $\text{unit}_2 = v)$ fof(ax$_4$, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax$_5$, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax$_6$, axiom)
$\exists u\colon (\text{sorti}_1(u)$ and $\forall v\colon (\text{sorti}_1(v) \Rightarrow \forall w\colon (\text{sorti}_1(w) \Rightarrow (\text{op}_1(v,w) \neq u$ or $(\text{op}_1(v,u) = w$ and $u \neq \text{unit}_1)))))$ fof(ax$_7$, axiom
$\neg \exists u\colon (\text{sorti}_2(u)$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \forall w\colon (\text{sorti}_2(w) \Rightarrow (\text{op}_2(v,w) \neq u$ or $(\text{op}_2(v,u) = w$ and $u \neq \text{unit}_2)))))$ fof(ax$_8$, axio

$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG073+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-5
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\mathrm{sorti}_1(u) \text{ and } \exists v\colon (\mathrm{sorti}_1(v) \text{ and } \mathrm{op}_1(u,u) = v \text{ and } \mathrm{op}_1(v,v) = u \text{ and } \mathrm{op}_1(u,v) \neq u))$ fof(ax$_3$, axiom)
$\neg\exists u\colon (\mathrm{sorti}_2(u) \text{ and } \exists v\colon (\mathrm{sorti}_2(v) \text{ and } \mathrm{op}_2(u,u) = v \text{ and } \mathrm{op}_2(v,v) = u \text{ and } \mathrm{op}_2(u,v) \neq u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG074+1.p Loops 5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-6
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\mathrm{sorti}_1(u) \text{ and } \exists v\colon (\mathrm{sorti}_1(v) \text{ and } \mathrm{op}_1(v,u) \neq \mathrm{op}_1(u,v) \text{ and } \mathrm{op}_1(\mathrm{op}_1(u,v),v) = u \text{ and } \mathrm{op}_1(\mathrm{op}_1(u,v),u) \neq v))$ fof(ax$_3$, a
$\neg\exists u\colon (\mathrm{sorti}_2(u) \text{ and } \exists v\colon (\mathrm{sorti}_2(v) \text{ and } \mathrm{op}_2(v,u) \neq \mathrm{op}_2(u,v) \text{ and } \mathrm{op}_2(\mathrm{op}_2(u,v),v) = u \text{ and } \mathrm{op}_2(\mathrm{op}_2(u,v),u) \neq v))$ fof(ax$_4$
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG176+1.p Quasigroups 5 QG4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\mathrm{sorti}_1(u) \text{ and } \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{op}_1(v,u) \neq v))$ fof(ax$_3$, axiom)
$\neg\exists u\colon (\mathrm{sorti}_2(u) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{op}_2(v,u) \neq v))$ fof(ax$_4$, axiom)
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG177+1.p Quasigroups 5 QG4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\exists u\colon (\mathrm{sorti}_1(u) \text{ and } \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{op}_1(u,v) \neq v))$ fof(ax$_3$, axiom)
$\neg\exists u\colon (\mathrm{sorti}_2(u) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{op}_2(u,v) \neq v))$ fof(ax$_4$, axiom)
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG178+1.p Quasigroups 5 QG4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-3
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{op}_1(u,\mathrm{op}_1(u,v)) = v))$ fof(ax$_3$, axiom)
$\neg\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{op}_2(u,\mathrm{op}_2(u,v)) = v))$ fof(ax$_4$, axiom)
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG179+1.p Quasigroups 5 QG4: CPROPS-SORTED-DISCRIMINANT-PROBLEM-4
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{op}_1(\mathrm{op}_1(u,v),v) = u))$ fof(ax$_3$, axiom)
$\neg\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{op}_2(\mathrm{op}_2(u,v),v) = u))$ fof(ax$_4$, axiom)
$(\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{sorti}_2(h(u))) \text{ and } \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\mathrm{sorti}_1(w) \Rightarrow \forall x\colon (\mathrm{sorti}_1(x) \Rightarrow$
$h(\mathrm{op}_1(w,x)) = \mathrm{op}_2(h(w),h(x)))) \text{ and } \forall y\colon (\mathrm{sorti}_2(y) \Rightarrow \forall z\colon (\mathrm{sorti}_2(z) \Rightarrow j(\mathrm{op}_2(y,z)) = \mathrm{op}_1(j(y),j(z)))) \text{ and } \forall x_1\colon (\mathrm{sorti}_2(x_1)$
$h(j(x_1)) = x_1) \text{ and } \forall x_2\colon (\mathrm{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co$_1$, conjecture)

ALG201+1.p Quasigroups 7 QG5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-1
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \forall v\colon (\mathrm{sorti}_1(v) \Rightarrow \mathrm{sorti}_1(\mathrm{op}_1(u,v))))$ fof(ax$_1$, axiom)
$\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \forall v\colon (\mathrm{sorti}_2(v) \Rightarrow \mathrm{sorti}_2(\mathrm{op}_2(u,v))))$ fof(ax$_2$, axiom)
$\forall u\colon (\mathrm{sorti}_1(u) \Rightarrow \mathrm{op}_1(u,u) \neq u)$ fof(ax$_3$, axiom)
$\neg\forall u\colon (\mathrm{sorti}_2(u) \Rightarrow \mathrm{op}_2(u,u) \neq u)$ fof(ax$_4$, axiom)

$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w), h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y), j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co_1, conjecture)

ALG202+1.p Quasigroups 7 QG5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-2
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax_1, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax_2, axiom)
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{op}_1(u,u) = u)$ fof(ax_3, axiom)
$\neg\forall u\colon (\text{sorti}_2(u) \Rightarrow \text{op}_2(u,u) = u)$ fof(ax_4, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w), h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y), j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co_1, conjecture)

ALG203+1.p Quasigroups 7 QG5: CPROPS-SORTED-DISCRIMINANT-PROBLEM-3
$\forall u\colon (\text{sorti}_1(u) \Rightarrow \forall v\colon (\text{sorti}_1(v) \Rightarrow \text{sorti}_1(\text{op}_1(u,v))))$ fof(ax_1, axiom)
$\forall u\colon (\text{sorti}_2(u) \Rightarrow \forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_2(\text{op}_2(u,v))))$ fof(ax_2, axiom)
$\exists u\colon (\text{sorti}_1(u)$ and $\text{op}_1(u,u) = u)$ and $\exists v\colon (\text{sorti}_1(v)$ and $\text{op}_1(v,v) \neq v)$ fof(ax_3, axiom)
$\neg\exists u\colon (\text{sorti}_2(u)$ and $\text{op}_2(u,u) = u)$ and $\exists v\colon (\text{sorti}_2(v)$ and $\text{op}_2(v,v) \neq v)$ fof(ax_4, axiom)
$(\forall u\colon (\text{sorti}_1(u) \Rightarrow \text{sorti}_2(h(u)))$ and $\forall v\colon (\text{sorti}_2(v) \Rightarrow \text{sorti}_1(j(v)))) \Rightarrow \neg\forall w\colon (\text{sorti}_1(w) \Rightarrow \forall x\colon (\text{sorti}_1(x) \Rightarrow$
$h(\text{op}_1(w,x)) = \text{op}_2(h(w), h(x))))$ and $\forall y\colon (\text{sorti}_2(y) \Rightarrow \forall z\colon (\text{sorti}_2(z) \Rightarrow j(\text{op}_2(y,z)) = \text{op}_1(j(y), j(z))))$ and $\forall x_1\colon (\text{sorti}_2(x_1)$
$h(j(x_1)) = x_1)$ and $\forall x_2\colon (\text{sorti}_1(x_2) \Rightarrow j(h(x_2)) = x_2)$ fof(co_1, conjecture)

ALG210+1.p Star-algebras are closed under multiplication
$\forall a,b,c\colon \text{times}(\text{times}(a,b),c) = \text{times}(b, \text{times}(c,a))$ fof(axiom_1, axiom)
$\forall b\colon (\text{element}(b) \iff \exists c\colon (\text{times}(b,c) = b$ and $\text{times}(b,b) = c))$ fof(axiom_2, axiom)
$\forall a,b\colon ((\text{element}(a)$ and $\text{element}(b)) \Rightarrow \text{element}(\text{times}(a,b)))$ fof(conjecture_1, conjecture)

ALG210+2.p Star-algebras are closed under multiplication
$\forall a,b,c\colon \text{times}(\text{times}(a,b),c) = \text{times}(b, \text{times}(c,a))$ fof(axiom_1, axiom)
$\forall b\colon (\text{element}(b) \iff \exists c\colon (\text{times}(b,c) = b$ and $\text{times}(b,b) = c))$ fof(axiom_2, axiom)
$\forall a,b,c\colon ((\text{element}(a)$ and $\text{element}(b)$ and $c = \text{times}(a,b)) \Rightarrow \text{element}(c))$ fof(conjecture_1, conjecture)

ALG211+1.p Vector spaces and bases
$\forall b,v\colon (\text{basis\_of}(b,v) \Rightarrow (\text{lin\_ind\_subset}(b,v)$ and $\text{a\_subset\_of}(b, \text{vec\_to\_class}(v))))$ fof(basis_of, axiom)
$\forall s,t,v\colon ((\text{lin\_ind\_subset}(s,v)$ and $\text{basis\_of}(t,v)) \Rightarrow \exists u\colon (\text{a\_subset\_of}(u,t)$ and $\text{basis\_of}(\text{union}(s,u),v)))$ fof(bg_2_2_5, axiom)
$\forall a\colon (\text{a\_vector\_space}(a) \Rightarrow \exists b\colon \text{basis\_of}(b,a))$ fof(bg_remark_63_a, axiom)
$\forall a,b\colon (\text{a\_vector\_subspace\_of}(a,b) \Rightarrow \text{a\_vector\_space}(a))$ fof(bg_2_4_a, axiom)
$\forall w,v,e\colon ((\text{a\_vector\_subspace\_of}(w,v)$ and $\text{a\_subset\_of}(e, \text{vec\_to\_class}(w))) \Rightarrow (\text{lin\_ind\_subset}(e,w) \iff \text{lin\_ind\_subset}(e,v)))$
$\forall w,v\colon ((\text{a\_vector\_subspace\_of}(w,v)$ and $\text{a\_vector\_space}(v)) \Rightarrow \exists e,f\colon (\text{basis\_of}(\text{union}(e,f),v)$ and $\text{basis\_of}(e,w)))$ fof(bg_2.

ALG212+1.p Distributivity, long version
include('Axioms/ALG002+0.ax')
$\forall u,w,x,y,z\colon f(f(x,y,z),u,w) = f(f(x,u,w), f(y,u,w), f(z,u,w))$ fof(dist_long, conjecture)

ALG213+1.p Distributivity, short version
include('Axioms/ALG002+0.ax')
$\forall u,w,x,y,z\colon f(f(x,y,z),u,w) = f(x, f(y,u,w), f(z,u,w))$ fof(dist_long, conjecture)

ALG235-1.p Short equational base for two varieties of groupoids - part 1a
$a \cdot (b \cdot (a \cdot b)) = a \cdot b$ cnf(c_{01}, axiom)
$a \cdot (b \cdot (c \cdot d)) = c \cdot (b \cdot (a \cdot d))$ cnf(c_{02}, axiom)
$(a \cdot (b \cdot (c \cdot b))) \cdot d = a \cdot (d \cdot ((c \cdot b) \cdot d))$ cnf(c_{03}, axiom)
$a \cdot (b \cdot (a \cdot (c \cdot (d \cdot c)))) \neq a \cdot (b \cdot (d \cdot c))$ cnf(goals, negated_conjecture)

ALG236-1.p Short equational base for two varieties of groupoids - part 1b
$a \cdot (b \cdot (a \cdot b)) = a \cdot b$ cnf(c_{01}, axiom)
$a \cdot (b \cdot (c \cdot d)) = c \cdot (b \cdot (a \cdot d))$ cnf(c_{02}, axiom)
$(a \cdot (b \cdot (c \cdot b))) \cdot d = a \cdot (d \cdot ((c \cdot b) \cdot d))$ cnf(c_{03}, axiom)
$(a \cdot b) \cdot (c \cdot (d \cdot e)) \neq a \cdot (c \cdot ((d \cdot b) \cdot e))$ cnf(goals, negated_conjecture)

ALG237-1.p Selfdistributive groupoids are symmetric-by-medial - part 1
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG238-1.p Selfdistributive groupoids are symmetric-by-medial - part 2

$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) \neq (a \cdot c) \cdot (b \cdot d)$ cnf(goals, negated_conjecture)

ALG239-1.p Selfdistributive groupoids are symmetric-by-medial - part 3
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) = (a \cdot c) \cdot (b \cdot d)$ cnf(c_{03}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG240-1.p Selfdistributive groupoids are symmetric-by-medial - part 4
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) = (a \cdot c) \cdot (b \cdot d)$ cnf(c_{03}, axiom)
$(((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) \cdot ((a \cdot c) \cdot (b \cdot d)) = (a \cdot b) \cdot (c \cdot d)$ cnf(c_{04}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG241-1.p Selfdistributive groupoids are symmetric-by-medial - part 5
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$(a \cdot a) \cdot b = a \cdot (b \cdot b)$ cnf(c_{03}, axiom)
$a \cdot (b \cdot (c \cdot c)) = a \cdot (b \cdot c)$ cnf(c_{04}, axiom)
$(a \cdot b) \cdot a = a \cdot (b \cdot a)$ cnf(c_{05}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) \neq (a \cdot c) \cdot (b \cdot d)$ cnf(goals, negated_conjecture)

ALG242-1.p Idempotent selfdistributive groupoids are symmetric-by-medial - 1
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$a \cdot a = a$ cnf(c_{03}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG243-1.p Idempotent selfdistributive groupoids are symmetric-by-medial - 2
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$a \cdot a = a$ cnf(c_{03}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) \neq (a \cdot c) \cdot (b \cdot d)$ cnf(goals, negated_conjecture)

ALG244-1.p Idempotent selfdistributive groupoids are symmetric-by-medial - 3
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) = (a \cdot c) \cdot (b \cdot d)$ cnf(c_{03}, axiom)
$a \cdot a = a$ cnf(c_{04}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG245-1.p Idempotent selfdistributive groupoids are symmetric-by-medial - 4
$a \cdot (b \cdot c) = (a \cdot b) \cdot (a \cdot c)$ cnf(c_{01}, axiom)
$(a \cdot b) \cdot c = (a \cdot c) \cdot (b \cdot c)$ cnf(c_{02}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot (((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) = (a \cdot c) \cdot (b \cdot d)$ cnf(c_{03}, axiom)
$(((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d))) \cdot ((a \cdot c) \cdot (b \cdot d)) = (a \cdot b) \cdot (c \cdot d)$ cnf(c_{04}, axiom)
$a \cdot a = a$ cnf(c_{05}, axiom)
$((a \cdot b) \cdot (c \cdot d)) \cdot ((a \cdot c) \cdot (b \cdot d)) \neq ((a \cdot c) \cdot (b \cdot d)) \cdot ((a \cdot b) \cdot (c \cdot d))$ cnf(goals, negated_conjecture)

ALG246-1.p Axioms of SBL algebras are not independent
$\mathrm{tptp}_1(a, b) = \mathrm{tptp}_1(b, a)$ cnf(c_{01}, axiom)
$\mathrm{tptp}_1(\mathrm{tptp}_5, a) = a$ cnf(c_{02}, axiom)
$\mathrm{tptp}_1(a, \mathrm{tptp}_0(a, b)) = \mathrm{tptp}_1(b, \mathrm{tptp}_0(b, a))$ cnf(c_{03}, axiom)
$\mathrm{tptp}_0(\mathrm{tptp}_1(a, b), c) = \mathrm{tptp}_0(a, \mathrm{tptp}_0(b, c))$ cnf(c_{04}, axiom)
$\mathrm{tptp}_0(\mathrm{tptp}_3, a) = \mathrm{tptp}_5$ cnf(c_{05}, axiom)
$\mathrm{tptp}_0(\mathrm{tptp}_0(\mathrm{tptp}_0(a, b), c), \mathrm{tptp}_0(\mathrm{tptp}_0(\mathrm{tptp}_0(b, a), c), c)) = \mathrm{tptp}_5$ cnf(c_{06}, axiom)
$\mathrm{tptp}_4(a, b) = \mathrm{tptp}_1(a, \mathrm{tptp}_0(a, b))$ cnf(c_{07}, axiom)
$v(a, b) = \mathrm{tptp}_4(\mathrm{tptp}_0(\mathrm{tptp}_0(a, b), b), \mathrm{tptp}_0(\mathrm{tptp}_0(b, a), a))$ cnf(c_{08}, axiom)
$\mathrm{tptp}_0(\mathrm{tptp}_1(a, b), \mathrm{tptp}_3) = v(\mathrm{tptp}_0(a, \mathrm{tptp}_3), \mathrm{tptp}_0(b, \mathrm{tptp}_3))$ cnf(c_{09}, axiom)
$m(a) = \mathrm{tptp}_0(a, \mathrm{tptp}_3)$ cnf(c_{10}, axiom)
$n(a) = m(\mathrm{tptp}_2(a))$ cnf(c_{11}, axiom)

$\text{tptp}_2(\text{tptp}_2(a)) = a$ $\quad$ $\text{cnf}(c_{12}, \text{axiom})$
$n(\text{tptp}_0(a, b)) = n(\text{tptp}_0(\text{tptp}_2(b), \text{tptp}_2(a)))$ $\quad$ $\text{cnf}(c_{13}, \text{axiom})$
$v(\text{tptp}_1(n(a), n(\text{tptp}_0(a, b))), n(b)) \neq n(b)$ $\quad$ cnf(goals, negated_conjecture)

ALG247∧2.p Push property lemma 0
include('Axioms/ALG003ˆ0.ax')
pushprop_lem0_lthm thf(thm, conjecture)

ALG248∧1.p Push property lemma 1
include('Axioms/ALG003ˆ0.ax')
pushprop_lem1_gthm thf(thm, conjecture)

ALG248∧2.p Push property lemma 1
include('Axioms/ALG003ˆ0.ax')
pushprop_lem1_lthm thf(thm, conjecture)

ALG248∧3.p Push property lemma 1
include('Axioms/ALG003ˆ0.ax')
pushprop_lem1v2_lthm thf(thm, conjecture)

ALG249∧3.p Push property lemma 2
include('Axioms/ALG003ˆ0.ax')
pushprop_lem2v2_lthm thf(thm, conjecture)

ALG250∧3.p Push property lemma 3
include('Axioms/ALG003ˆ0.ax')
pushprop_lem3v2_lthm thf(thm, conjecture)

ALG251∧1.p Push property
include('Axioms/ALG003ˆ0.ax')
pushprop_gthm thf(thm, conjecture)

ALG251∧2.p Push property
include('Axioms/ALG003ˆ0.ax')
pushprop_lthm thf(thm, conjecture)

ALG251∧3.p Push property
include('Axioms/ALG003ˆ0.ax')
pushprop_lthm_orig thf(thm, conjecture)

ALG252∧1.p Induction lemma
include('Axioms/ALG003ˆ0.ax')
induction2lem_gthm thf(thm, conjecture)

ALG252∧2.p Induction lemma
include('Axioms/ALG003ˆ0.ax')
induction2lem_lthm thf(thm, conjecture)

ALG253∧1.p Induction
include('Axioms/ALG003ˆ0.ax')
induction2_gthm thf(thm, conjecture)

ALG253∧2.p Induction
include('Axioms/ALG003ˆ0.ax')
induction2_lthm thf(thm, conjecture)

ALG254∧1.p M is a monoid and T is an M-set
include('Axioms/ALG003ˆ0.ax')
substmonoid_gthm thf(thm, conjecture)

ALG254∧2.p M is a monoid and T is an M-set
include('Axioms/ALG003ˆ0.ax')
substmonoid_lthm thf(thm, conjecture)

ALG255∧1.p T is an M-set
include('Axioms/ALG003ˆ0.ax')
termmset_gthm thf(thm, conjecture)

ALG256∧1.p HOASap is injective 1
include('Axioms/ALG003ˆ0.ax')

hoasapinj1_gthm   thf(thm, conjecture)

ALG256∧2.p HOASap is injective 1
include('Axioms/ALG003ˆ0.ax')
hoasapinj1_lthm   thf(thm, conjecture)

ALG257∧1.p HOASap is injective 2
include('Axioms/ALG003ˆ0.ax')
hoasapinj2_gthm   thf(thm, conjecture)

ALG257∧2.p HOASap is injective 2
include('Axioms/ALG003ˆ0.ax')
hoasapinj2_lthm   thf(thm, conjecture)

ALG258∧1.p HOASlam is injective
include('Axioms/ALG003ˆ0.ax')
hoaslaminj_gthm   thf(thm, conjecture)

ALG258∧2.p HOASlam is injective
include('Axioms/ALG003ˆ0.ax')
hoaslaminj_lthm   thf(thm, conjecture)

ALG259∧1.p HOASlam not ap
include('Axioms/ALG003ˆ0.ax')
hoaslamnotap_gthm   thf(thm, conjecture)

ALG259∧2.p HOASlam not ap
include('Axioms/ALG003ˆ0.ax')
hoaslamnotap_lthm   thf(thm, conjecture)

ALG260∧1.p HOASlam not var
include('Axioms/ALG003ˆ0.ax')
hoaslamnotvar_gthm   thf(thm, conjecture)

ALG260∧2.p HOASlam not var
include('Axioms/ALG003ˆ0.ax')
hoaslamnotvar_lthm   thf(thm, conjecture)

ALG261∧1.p HOASap not var
include('Axioms/ALG003ˆ0.ax')
hoasapnotvar_gthm   thf(thm, conjecture)

ALG261∧2.p HOASap not var
include('Axioms/ALG003ˆ0.ax')
hoasapnotvar_lthm   thf(thm, conjecture)

ALG262∧2.p HOAS induction lemma 0
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem0_lthm   thf(thm, conjecture)

ALG263∧1.p HOAS induction lemma 1
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem1_gthm   thf(thm, conjecture)

ALG263∧3.p HOAS induction lemma 1
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem1v2_gthm   thf(thm, conjecture)

ALG264∧1.p HOAS induction lemma 2
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem2_gthm   thf(thm, conjecture)

ALG264∧3.p HOAS induction lemma 2
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem2v2_gthm   thf(thm, conjecture)

ALG265∧2.p HOAS induction lemma 3aa
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3aa_lthm   thf(thm, conjecture)

ALG266∧1.p HOAS induction lemma 3a

include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3a_gthm thf(thm, conjecture)

ALG266∧2.p HOAS induction lemma 3a
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3a_lthm thf(thm, conjecture)

ALG267∧1.p HOAS induction lemma 3b
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3b_gthm thf(thm, conjecture)

ALG267∧2.p HOAS induction lemma 3b
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3b_lthm thf(thm, conjecture)

ALG268∧1.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3_gthm thf(thm, conjecture)

ALG268∧2.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3_lthm thf(thm, conjecture)

ALG268∧3.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3v2a_lthm thf(thm, conjecture)

ALG268∧4.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3v2_f_lthm thf(thm, conjecture)

ALG268∧5.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3v2_gthm thf(thm, conjecture)

ALG268∧6.p HOAS induction lemma 3
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lem3v2_lthm thf(thm, conjecture)

ALG269∧1.p HOAS induction
include('Axioms/ALG003ˆ0.ax')
hoasinduction_gthm thf(thm, conjecture)

ALG269∧2.p HOAS induction
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lthm thf(thm, conjecture)

ALG269∧3.p HOAS induction
include('Axioms/ALG003ˆ0.ax')
hoasinduction_lthm$_3$ thf(thm, conjecture)

ALG269∧4.p HOAS induction
include('Axioms/ALG003ˆ0.ax')
hoasinduction_no_psi_cond_lthm thf(thm, conjecture)

ALG270∧5.p TPS problem THM23
a: $tType thf(a_type, type)
c_star: $a \to a \to a$ thf(c_star, type)
∀xx: a, xy: a, xz: a: (c_star@(c_star@xx@xy)@xz) = (c_star@xx@(c_star@xy@xz)) ⇒ ∀w: a, x: a, y: a, z: a: (c_star@(c_star@(c
(c_star@w@(c_star@x@(c_star@y@z))) thf(cTHM23_pme, conjecture)

ALG271∧5.p TPS problem EQUIV-01-03
g: $tType thf(g_type, type)
cGROUP$_1$: $(g \to g \to g) \to g \to$ $o thf(cGROUP1_type, type)
cGROUP$_3$: $(g \to g \to g) \to g \to$ $o thf(cGROUP3_type, type)
cGRP_ASSOC: $(g \to g \to g) \to$ $o thf(cGRP_ASSOC_type, type)
cGRP_INVERSE: $(g \to g \to g) \to g \to$ $o thf(cGRP_INVERSE_type, type)
cGRP_RIGHT_INVERSE: $(g \to g \to g) \to g \to$ $o thf(cGRP_RIGHT_INVERSE_type, type)
cGRP_RIGHT_UNIT: $(g \to g \to g) \to g \to$ $o thf(cGRP_RIGHT_UNIT_type, type)

cGRP_UNIT: (g → g → g) → g → $o thf(cGRP_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: ((xf@xa@xb) = xe and (xf@xb@xa) = xe)) thf(cGRP_INVERS
cGRP_RIGHT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xa@xb) = xe) thf(cGRP_RIGHT_INVERSE_def, d
cGRP_RIGHT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xa@xe) = xa) thf(cGRP_RIGHT_UNIT_def, definition)
cGRP_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: ((xf@xe@xa) = xa and (xf@xa@xe) = xa)) thf(cGRP_UNIT_def, definition)
cGROUP$_1$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_UNIT@xf@xe and cGRP_INVERSE@xf@xe)) thf(cG
cGROUP$_3$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_RIGHT_UNIT@xf@xe and cGRP_RIGHT_INVERSE@xf
∀xf: g → g → g, xe: g: ((cGROUP$_1$@xf@xe) ⟺ (cGROUP$_3$@xf@xe)) thf(cEQUIV_01$_{03}$, conjecture)

ALG272^5.p TPS problem EQUIV-01-02
g: $tType thf(g_type, type)
cGROUP$_1$: (g → g → g) → g → $o thf(cGROUP1_type, type)
cGROUP$_2$: (g → g → g) → g → $o thf(cGROUP2_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_INVERSE: (g → g → g) → g → $o thf(cGRP_INVERSE_type, type)
cGRP_LEFT_INVERSE: (g → g → g) → g → $o thf(cGRP_LEFT_INVERSE_type, type)
cGRP_LEFT_UNIT: (g → g → g) → g → $o thf(cGRP_LEFT_UNIT_type, type)
cGRP_UNIT: (g → g → g) → g → $o thf(cGRP_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: ((xf@xa@xb) = xe and (xf@xb@xa) = xe)) thf(cGRP_INVERS
cGRP_LEFT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xb@xa) = xe) thf(cGRP_LEFT_INVERSE_def, defi
cGRP_LEFT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xe@xa) = xa) thf(cGRP_LEFT_UNIT_def, definition)
cGRP_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: ((xf@xe@xa) = xa and (xf@xa@xe) = xa)) thf(cGRP_UNIT_def, definition)
cGROUP$_1$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_UNIT@xf@xe and cGRP_INVERSE@xf@xe)) thf(cG
cGROUP$_2$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_LEFT_UNIT@xf@xe and cGRP_LEFT_INVERSE@xf@x
∀xf: g → g → g, xe: g: ((cGROUP$_1$@xf@xe) ⟺ (cGROUP$_2$@xf@xe)) thf(cEQUIV_01$_{02}$, conjecture)

ALG273^5.p TPS problem EQUIV-02-03
g: $tType thf(g_type, type)
cGROUP$_2$: (g → g → g) → g → $o thf(cGROUP2_type, type)
cGROUP$_3$: (g → g → g) → g → $o thf(cGROUP3_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_LEFT_INVERSE: (g → g → g) → g → $o thf(cGRP_LEFT_INVERSE_type, type)
cGRP_LEFT_UNIT: (g → g → g) → g → $o thf(cGRP_LEFT_UNIT_type, type)
cGRP_RIGHT_INVERSE: (g → g → g) → g → $o thf(cGRP_RIGHT_INVERSE_type, type)
cGRP_RIGHT_UNIT: (g → g → g) → g → $o thf(cGRP_RIGHT_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_LEFT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xb@xa) = xe) thf(cGRP_LEFT_INVERSE_def, defi
cGRP_LEFT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xe@xa) = xa) thf(cGRP_LEFT_UNIT_def, definition)
cGRP_RIGHT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xa@xb) = xe) thf(cGRP_RIGHT_INVERSE_def, d
cGRP_RIGHT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xa@xe) = xa) thf(cGRP_RIGHT_UNIT_def, definition)
cGROUP$_2$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_LEFT_UNIT@xf@xe and cGRP_LEFT_INVERSE@xf@x
cGROUP$_3$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_RIGHT_UNIT@xf@xe and cGRP_RIGHT_INVERSE@xf
∀xf: g → g → g, xe: g: ((cGROUP$_2$@xf@xe) ⟺ (cGROUP$_3$@xf@xe)) thf(cEQUIV_02$_{03}$, conjecture)

ALG274^5.p TPS problem from GRP-THMS
g: $tType thf(g_type, type)
cGROUP$_3$: (g → g → g) → g → $o thf(cGROUP3_type, type)
cGROUP$_4$: (g → g → g) → $o thf(cGROUP4_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_DIVISORS: (g → g → g) → $o thf(cGRP_DIVISORS_type, type)
cGRP_RIGHT_INVERSE: (g → g → g) → g → $o thf(cGRP_RIGHT_INVERSE_type, type)
cGRP_RIGHT_UNIT: (g → g → g) → g → $o thf(cGRP_RIGHT_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_DIVISORS = (λxf: g → g → g: ∀xa: g, xb: g: (∃xx: g: (xf@xa@xx) = xb and ∃xy: g: (xf@xy@xa) = xb)) thf(cGRP_DIVISORS_def, definition)
cGRP_RIGHT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xa@xb) = xe) thf(cGRP_RIGHT_INVERSE_def, d
cGRP_RIGHT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xa@xe) = xa) thf(cGRP_RIGHT_UNIT_def, definition)
cGROUP$_3$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_RIGHT_UNIT@xf@xe and cGRP_RIGHT_INVERSE@xf
cGROUP$_4$ = (λxf: g → g → g: (cGRP_ASSOC@xf and cGRP_DIVISORS@xf)) thf(cGROUP4_def, definition)

∀xf: g → g → g: (∃xe: g: (cGROUP$_3$@xf@xe) ⟺ (cGROUP$_4$@xf)) thf(cEQUIV_03$_{04}$, conjecture)

ALG275^5.p TPS problem from GRP-THMS
g: $tType thf(g_type, type)
f: g → g → g thf(f_type, type)
cGROUP$_2$: (g → g → g) → g → $o thf(cGROUP2_type, type)
cGROUP$_4$: (g → g → g) → $o thf(cGROUP4_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_DIVISORS: (g → g → g) → $o thf(cGRP_DIVISORS_type, type)
cGRP_LEFT_INVERSE: (g → g → g) → g → $o thf(cGRP_LEFT_INVERSE_type, type)
cGRP_LEFT_UNIT: (g → g → g) → g → $o thf(cGRP_LEFT_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_DIVISORS = (λxf: g → g → g: ∀xa: g, xb: g: (∃xx: g: (xf@xa@xx) = xb and ∃xy: g: (xf@xy@xa) = xb)) thf(cGRP_DIVISORS_def, definition)
cGRP_LEFT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xb@xa) = xe) thf(cGRP_LEFT_INVERSE_def, defi
cGRP_LEFT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xe@xa) = xa) thf(cGRP_LEFT_UNIT_def, definition)
cGROUP$_2$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_LEFT_UNIT@xf@xe and cGRP_LEFT_INVERSE@xf@x
cGROUP$_4$ = (λxf: g → g → g: (cGRP_ASSOC@xf and cGRP_DIVISORS@xf)) thf(cGROUP4_def, definition)
∀xf$_0$: g → g → g: ∃xe: g: (cGROUP$_2$@xf$_0$@xe) ⟺ (cGROUP$_4$@f) thf(cEQUIV_02$_{04}$, conjecture)

ALG276^5.p TPS problem from GRP-THMS
g: $tType thf(g_type, type)
cGROUP$_1$: (g → g → g) → g → $o thf(cGROUP1_type, type)
cGROUP$_4$: (g → g → g) → $o thf(cGROUP4_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_DIVISORS: (g → g → g) → $o thf(cGRP_DIVISORS_type, type)
cGRP_INVERSE: (g → g → g) → g → $o thf(cGRP_INVERSE_type, type)
cGRP_UNIT: (g → g → g) → g → $o thf(cGRP_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_DIVISORS = (λxf: g → g → g: ∀xa: g, xb: g: (∃xx: g: (xf@xa@xx) = xb and ∃xy: g: (xf@xy@xa) = xb)) thf(cGRP_DIVISORS_def, definition)
cGRP_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: ((xf@xa@xb) = xe and (xf@xb@xa) = xe)) thf(cGRP_INVERS
cGRP_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: ((xf@xe@xa) = xa and (xf@xa@xe) = xa)) thf(cGRP_UNIT_def, definition
cGROUP$_1$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_UNIT@xf@xe and cGRP_INVERSE@xf@xe)) thf(cG
cGROUP$_4$ = (λxf: g → g → g: (cGRP_ASSOC@xf and cGRP_DIVISORS@xf)) thf(cGROUP4_def, definition)
∀xf: g → g → g: (∃xe: g: (cGROUP$_1$@xf@xe) ⟺ (cGROUP$_4$@xf)) thf(cEQUIV_01$_{04}$, conjecture)

ALG277^5.p TPS problem from GRP-THMS
g: $tType thf(g_type, type)
cGROUP$_3$: (g → g → g) → g → $o thf(cGROUP3_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_RIGHT_INVERSE: (g → g → g) → g → $o thf(cGRP_RIGHT_INVERSE_type, type)
cGRP_RIGHT_UNIT: (g → g → g) → g → $o thf(cGRP_RIGHT_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_RIGHT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xa@xb) = xe) thf(cGRP_RIGHT_INVERSE_def, d
cGRP_RIGHT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xa@xe) = xa) thf(cGRP_RIGHT_UNIT_def, definition)
cGROUP$_3$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_RIGHT_UNIT@xf@xe and cGRP_RIGHT_INVERSE@xf
∀xf: g → g → g, xe: g: ((cGROUP$_3$@xf@xe) ⇒ ∀xa: g: (xf@xe@xa) = xa) thf(cE13A$_2$, conjecture)

ALG278^5.p TPS problem from GRP-THMS
g: $tType thf(g_type, type)
cGROUP$_2$: (g → g → g) → g → $o thf(cGROUP2_type, type)
cGRP_ASSOC: (g → g → g) → $o thf(cGRP_ASSOC_type, type)
cGRP_LEFT_INVERSE: (g → g → g) → g → $o thf(cGRP_LEFT_INVERSE_type, type)
cGRP_LEFT_UNIT: (g → g → g) → g → $o thf(cGRP_LEFT_UNIT_type, type)
cGRP_ASSOC = (λxf: g → g → g: ∀xa: g, xb: g, xc: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc))) thf(cGRP_ASSOC
cGRP_LEFT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xb@xa) = xe) thf(cGRP_LEFT_INVERSE_def, defi
cGRP_LEFT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xe@xa) = xa) thf(cGRP_LEFT_UNIT_def, definition)
cGROUP$_2$ = (λxf: g → g → g, xe: g: (cGRP_ASSOC@xf and cGRP_LEFT_UNIT@xf@xe and cGRP_LEFT_INVERSE@xf@x
∀xf: g → g → g, xe: g: ((cGROUP$_2$@xf@xe) ⇒ ∀xa: g: (xf@xa@xe) = xa) thf(cE12A$_1$, conjecture)

ALG279^5.p TPS problem from GRP-THMS

g: $tType thf(g_type, type)
cGRP_RIGHT_INVERSE: (g → g → g) → g → $o thf(cGRP_RIGHT_INVERSE_type, type)
cGRP_RIGHT_UNIT: (g → g → g) → g → $o thf(cGRP_RIGHT_UNIT_type, type)
cGRP_RIGHT_INVERSE = (λxf: g → g → g, xe: g: ∀xa: g: ∃xb: g: (xf@xa@xb) = xe) thf(cGRP_RIGHT_INVERSE_def, d
cGRP_RIGHT_UNIT = (λxf: g → g → g, xe: g: ∀xa: g: (xf@xa@xe) = xa) thf(cGRP_RIGHT_UNIT_def, definition)
∀xf: g → g → g, xe: g: ((∀xb: g, xc: g, xa: g: (xf@(xf@xa@xb)@xc) = (xf@xa@(xf@xb@xc)) and cGRP_RIGHT_UNIT@xf@xe a
∀xa: g: (xf@xe@xa) = xa) thf(cE13A2A, conjecture)

ALG280^5.p TPS problem from GRP-THMS
a: $tType thf(a_type, type)
cE: a thf(cE, type)
cP: a → a → a thf(cP, type)
cJ: a → a thf(cJ, type)
(∀xx: a, xy: a, xz: a: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: a: (cP@cE@xx) = xx and ∀xy: a: (cP@(cJ@xy
cE) ⇒ ∀x: a: (cP@x@cE) = x thf(cTHM17_pme, conjecture)

ALG281^5.p TPS problem from GRP-THMS
cE: $i thf(cE, type)
cJ: $i → $i thf(cJ, type)
cP: $i → $i → $i thf(cP, type)
(∀xx: $i, xy: $i, xz: $i: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: $i: (cP@cE@xx) = xx and ∀xy: $i: (cP@(cJ@
cE) ⇒ ∀x: $i: (cP@x@(cJ@x)) = cE thf(cTHM16_pme, conjecture)

ALG282^5.p TPS problem from GRP-THMS
a: $tType thf(a_type, type)
cP: a → a → a thf(cP, type)
cE: a thf(cE, type)
cJ: a → a thf(cJ, type)
(∀xx: a, xy: a, xz: a: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: a: (cP@cE@xx) = xx and ∀xy: a: (cP@(cJ@xy
cE) ⇒ ∀x: a, y: a: ∃w: a: (cP@w@x) = y thf(cTHM21_pme, conjecture)

ALG283^5.p TPS problem from GRP-THMS
a: $tType thf(a_type, type)
cP: a → a → a thf(cP, type)
cE: a thf(cE, type)
cJ: a → a thf(cJ, type)
(∀xx: a, xy: a, xz: a: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: a: (cP@cE@xx) = xx and ∀xy: a: (cP@(cJ@xy
cE) ⇒ ∀x: a, y: a: ∃z: a: (cP@x@z) = y thf(cTHM20_pme, conjecture)

ALG284^5.p TPS problem from GRP-THMS
cJ: $i → $i thf(cJ, type)
cP: $i → $i → $i thf(cP, type)
cE: $i thf(cE, type)
(∀xx: $i, xy: $i, xz: $i: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: $i: (cP@cE@xx) = xx and ∀xy: $i: (cP@(cJ@
cE) ⇒ ∀x: $i, y: $i: (cJ@(cP@x@y)) = (cP@(cJ@y)@(cJ@x)) thf(cTHM18_pme, conjecture)

ALG285^5.p TPS problem from GRP-THMS
a: $tType thf(a_type, type)
cP: a → a → a thf(cP, type)
cE: a thf(cE, type)
cJ: a → a thf(cJ, type)
(∀xx: a, xy: a, xz: a: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀xx: a: (cP@cE@xx) = xx and ∀xy: a: (cP@(cJ@xy
cE) ⇒ (∀xx: a, xy: a, xz: a: (cP@(cP@xx@xy)@xz) = (cP@xx@(cP@xy@xz)) and ∀x: a, y: a: (∃u: a: (cP@x@u) =
y and ∃v: a: (cP@v@x) = y)) thf(cTHM22_pme, conjecture)

ALG286^5.p TPS problem from PAIRING-UNPAIRING-ALG-THMS
a: $tType thf(a_type, type)
cZ: a thf(cZ, type)
u: a thf(u, type)
y: a thf(y, type)
x: a thf(x, type)
cP: a → a → a thf(cP, type)
cR: a → a thf(cR, type)

cL: $a \to a$ thf(cL, type)
((cL@cZ) = cZ and (cR@cZ) = cZ and ∀xx$_0$: a, xy$_0$: a: (cL@(cP@xx$_0$@xy$_0$)) = xx$_0$ and ∀xx$_0$: a, xy$_0$: a: (cR@(cP@xx$_0$@xy$_0$))
xy$_0$ and ∀xt: a: (xt ≠ cZ ⟺ xt = (cP@(cL@xt)@(cR@xt)))) ⇒ (u = (cP@x@y) ⇒ u ≠ cZ) thf(cPU_PAIR_NOT_ZE

ALG287^5.p TPS problem from PAIRING-UNPAIRING-ALG-THMS
a: $tType thf(a_type, type)
v: a thf(v, type)
u: a thf(u, type)
y: a thf(y, type)
x: a thf(x, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
cZ: a thf(cZ, type)
((cL@cZ) = cZ and (cR@cZ) = cZ and ∀xx$_0$: a, xy$_0$: a: (cL@(cP@xx$_0$@xy$_0$)) = xx$_0$ and ∀xx$_0$: a, xy$_0$: a: (cR@(cP@xx$_0$@xy$_0$))
xy$_0$ and ∀xt: a: (xt ≠ cZ ⟺ xt = (cP@(cL@xt)@(cR@xt)))) ⇒ ((cP@x@u) = (cP@y@v) ⇒ (x = y and u =
v)) thf(cPU_P_INJ_pme, conjecture)

ALG288^5.p TPS problem from PU-LAMBDA-MODEL-THMS
a: $tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
cZ: a thf(cZ, type)
((cL@cZ) = cZ and (cR@cZ) = cZ and ∀xx: a, xy: a: (cL@(cP@xx@xy)) = xx and ∀xx: a, xy: a: (cR@(cP@xx@xy)) =
xy and ∀xt: a: (xt ≠ cZ ⟺ xt = (cP@(cL@xt)@(cR@xt))) and ∀x: a → $o: (∃xt: a: (x@xt and ∀xu: a: ((x@xu) ⇒
(x@(cL@xu)))) ⇒ (x@cZ))) ⇒ ∀x: a → $o, xz: a: (∃xy: a: (x@(cP@xy@xz)) ⟺ ∃xx: a: (∀xx$_{29}$: a: (∀x_0: a →
$o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒ (x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv) = xx$_{29}$)) ⇒
(x@xx$_{29}$)) and ∃xy: a: ∀x_0: a → $o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒ (x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv) =
(cP@xy@xz))))) thf(cPU_SETR_CTS_pme, conjecture)

ALG289^5.p TPS problem from PU-LAMBDA-MODEL-THMS
a: $tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
cZ: a thf(cZ, type)
((cL@cZ) = cZ and (cR@cZ) = cZ and ∀xx: a, xy: a: (cL@(cP@xx@xy)) = xx and ∀xx: a, xy: a: (cR@(cP@xx@xy)) =
xy and ∀xt: a: (xt ≠ cZ ⟺ xt = (cP@(cL@xt)@(cR@xt))) and ∀x: a → $o: (∃xt: a: (x@xt and ∀xu: a: ((x@xu) ⇒
(x@(cL@xu)))) ⇒ (x@cZ))) ⇒ ∀x: a → $o, xz: a: (∃xz$_0$: a: (x@(cP@xz@xz$_0$)) ⟺ ∃xx: a: (∀xx$_{13}$: a: (∀x_0: a →
$o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒ (x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv) = xx$_{13}$)) ⇒
(x@xx$_{13}$)) and ∃xz$_1$: a: ∀x_0: a → $o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒ (x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv)
(cP@xz@xz$_1$))))) thf(cPU_SETL_CTS_pme, conjecture)

ALG290^5.p TPS problem from PU-LAMBDA-MODEL-THMS
a: $tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cG: a → $o thf(cG, type)
cX: a → $o thf(cX, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
cF: a → $o thf(cF, type)
cZ: a thf(cZ, type)
((cL@cZ) = cZ and (cR@cZ) = cZ and ∀xx: a, xy: a: (cL@(cP@xx@xy)) = xx and ∀xx: a, xy: a: (cR@(cP@xx@xy)) =
xy and ∀xt: a: (xt ≠ cZ ⟺ xt = (cP@(cL@xt)@(cR@xt))) and ∀x_0: a → $o: (∃xt: a: (x_0@xt and ∀xu: a: ((x_0@xu) ⇒
(x_0@(cL@xu)))) ⇒ (x_0@cZ))) ⇒ (λxy: a: ∃xx: a: (∀xx$_{17}$: a: (∀x_0: a → $o: (($x_0$@xx and ∀xz: a: ((x_0@xz) ⇒
(x_0@(cL@xz)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv) = xx$_{17}$)) ⇒ (cX@xx$_{17}$)) and (cF@(cP@xx@xy) or cG@(cP@xx@xy)))) =
(λxz: a: (∃xx: a: (∀xx$_{18}$: a: (∀x_0: a → $o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒ (x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@
xx$_{18}$)) ⇒ (cX@xx$_{18}$)) and cF@(cP@xx@xz)) or ∃xx: a: (∀xx$_{19}$: a: (∀x_0: a → $o: (($x_0$@xx and ∀xz$_0$: a: ((x_0@xz$_0$) ⇒
(x_0@(cL@xz$_0$)))) ⇒ ∃xv: a: (x_0@xv and (cR@xv) = xx$_{19}$)) ⇒ (cX@xx$_{19}$)) and cG@(cP@xx@xz)))) thf(cPU_X2310A_p

ALG291^5.p TPS problem from PU-LAMBDA-MODEL-THMS

a: \$tType thf(a_type, type)
$\forall z\colon a, p\colon a \to a \to a, l\colon a \to a, r\colon a \to a, x\colon a \to \$o\colon (((l@z) = z \text{ and } (r@z) = z \text{ and } \forall xx\colon a, xy\colon a\colon (l@(p@xx@xy)) =$
$xx \text{ and } \forall xx\colon a, xy\colon a\colon (r@(p@xx@xy)) = xy \text{ and } \forall xt\colon a\colon (xt \neq z \iff xt = (p@(l@xt)@(r@xt))) \text{ and } \forall x_0\colon a \to$
$\$o\colon (\exists xt\colon a\colon (x_0@xt \text{ and } \forall xu\colon a\colon ((x_0@xu) \Rightarrow (x_0@(l@xu)))) \Rightarrow (x_0@z))) \Rightarrow \forall x_0\colon a \to \$o, xz\colon a\colon (\exists xx\colon a\colon (\forall xx_9\colon a\colon (\forall x_0\colon a \to$
$\$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = xx_9)) \Rightarrow (x@xx_9)) \text{ and } x_0@(p@xx$
$\exists xx\colon a\colon (\forall xx_{10}\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) =$
$xx_{10})) \Rightarrow (x_0@xx_{10})) \text{ and } \exists xx_{12}\colon a\colon (\forall xx_{11}\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx_{12} \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow$
$\exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = xx_{11})) \Rightarrow (x@xx_{11})) \text{ and } \forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow$
$(x_0@(l@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = (p@xx_{12}@xz)))))))$ thf(cPU_X238B_pme, conjecture)

ALG292∧5.p TPS problem from PU-LAMBDA-MODEL-THMS
a: \$tType thf(a_type, type)
$\forall z\colon a, p\colon a \to a \to a, l\colon a \to a, r\colon a \to a, f\colon a \to \$o\colon (((l@z) = z \text{ and } (r@z) = z \text{ and } \forall xx\colon a, xy\colon a\colon (l@(p@xx@xy)) =$
$xx \text{ and } \forall xx\colon a, xy\colon a\colon (r@(p@xx@xy)) = xy \text{ and } \forall xt\colon a\colon (xt \neq z \iff xt = (p@(l@xt)@(r@xt))) \text{ and } \forall x\colon a \to$
$\$o\colon (\exists xt\colon a\colon (x@xt \text{ and } \forall xu\colon a\colon ((x@xu) \Rightarrow (x@(l@xu)))) \Rightarrow (x@z))) \Rightarrow \forall x\colon a \to \$o, xz\colon a\colon (\exists xx\colon a\colon (\forall xx_5\colon a\colon (\forall x_0\colon a \to$
$\$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = xx_5)) \Rightarrow (x@xx_5)) \text{ and } f@(p@xx@$
$\exists xx\colon a\colon (\forall xx_6\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) =$
$xx_6)) \Rightarrow (x@xx_6)) \text{ and } \exists xx_8\colon a\colon (\forall xx_7\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx_8 \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow$
$\exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = xx_7)) \Rightarrow \forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(l@xz_0)))) \Rightarrow$
$\exists xv\colon a\colon (x_0@xv \text{ and } (r@xv) = xx_7))) \text{ and } f@(p@xx_8@xz)))))$ thf(cPU_X238A_pme, conjecture)

ALG293∧5.p TPS problem from PU-LAMBDA-MODEL-THMS
a: \$tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
cZ: a thf(cZ, type)
$((cL@cZ) = cZ \text{ and } (cR@cZ) = cZ \text{ and } \forall xx\colon a, xy\colon a\colon (cL@(cP@xx@xy)) = xx \text{ and } \forall xx\colon a, xy\colon a\colon (cR@(cP@xx@xy)) =$
$xy \text{ and } \forall xt\colon a\colon (xt \neq cZ \iff xt = (cP@(cL@xt)@(cR@xt))) \text{ and } \forall x\colon a \to \$o\colon (\exists xt\colon a\colon (x@xt \text{ and } \forall xu\colon a\colon ((x@xu) \Rightarrow$
$(x@(cL@xu)))) \Rightarrow (x@cZ))) \Rightarrow \forall x\colon a \to \$o, xz\colon a\colon (\exists xx\colon a\colon (\forall xx_{23}\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow$
$(x_0@(cL@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (cR@xv) = xx_{23})) \Rightarrow \exists xy\colon a\colon (x@(cP@xy@xx_{23}))) \text{ and } \exists xz_2\colon a\colon (x@(cP@(cP@xx@$
$\exists xx\colon a\colon (\forall xx_{24}\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(cL@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (cR@xv) =$
$xx_{24})) \Rightarrow (x@xx_{24})) \text{ and } \exists xx_{26}\colon a\colon (\forall xx_{25}\colon a\colon (\forall x_0\colon a \to \$o\colon ((x_0@xx_{26} \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(cL@xz_0)))) \Rightarrow$
$\exists xv\colon a\colon (x_0@xv \text{ and } (cR@xv) = xx_{25})) \Rightarrow \exists xy\colon a\colon \forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow (x_0@(cL@xz_0)))) \Rightarrow$
$\exists xv\colon a\colon (x_0@xv \text{ and } (cR@xv) = (cP@xy@xx_{25})))) \text{ and } \exists xz_3\colon a\colon \forall x_0\colon a \to \$o\colon ((x_0@xx \text{ and } \forall xz_0\colon a\colon ((x_0@xz_0) \Rightarrow$
$(x_0@(cL@xz_0)))) \Rightarrow \exists xv\colon a\colon (x_0@xv \text{ and } (cR@xv) = (cP@(cP@xx_{26}@xz)@xz_3))))))$ thf(cPU_X239_pme, conjecture)

ALG295∧5.p TPS problem from SEQUENTIAL-PU-ALG-THMS
a: \$tType thf(a_type, type)
cZ: a thf(cZ, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
$((cL@cZ) = cZ \text{ and } (cR@cZ) = cZ \text{ and } \forall xx\colon a, xy\colon a\colon (cL@(cP@xx@xy)) = xx \text{ and } \forall xx\colon a, xy\colon a\colon (cR@(cP@xx@xy)) =$
$xy \text{ and } \forall xt\colon a\colon (xt \neq cZ \iff xt = (cP@(cL@xt)@(cR@xt)))) \Rightarrow (\forall x\colon a \to \$o\colon (\exists xt\colon a\colon (x@xt \text{ and } \forall xu\colon a\colon ((x@xu) \Rightarrow$
$(x@(cL@xu)))) \Rightarrow (x@cZ)) \iff \forall xt\colon a\colon \exists xn\colon a\colon (\forall x\colon a \to \$o\colon ((x@cZ \text{ and } \forall xx\colon a\colon ((x@xx) \Rightarrow (x@(cP@xx@cZ)))) \Rightarrow$
$(x@xn)) \text{ and } \forall xu\colon a\colon (\exists xb\colon a, xu_{11}\colon a\colon ((cP@xn@xu) = (cP@xb@xu_{11}) \text{ and } \forall x\colon a \to \$o\colon ((x@(cP@cZ@xt) \text{ and } \forall xc\colon a, xv\colon a\colon ((x$
$(x@(cP@(cP@xc@cZ)@(cL@xv)) \text{ and } x@(cP@(cP@xc@(cP@cZ@cZ))@(cR@xv))))) \Rightarrow (x@(cP@xb@xu_{11})))) \Rightarrow$
$xu = cZ)))$ thf(cPU_LEM8_pme, conjecture)

ALG296∧5.p TPS problem from SEQUENTIAL-PU-ALG-THMS
a: \$tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cR: $a \to a$ thf(cR, type)
cZ: a thf(cZ, type)
cL: $a \to a$ thf(cL, type)
$((cL@cZ) = cZ \text{ and } (cR@cZ) = cZ \text{ and } \forall xx\colon a, xy\colon a\colon (cL@(cP@xx@xy)) = xx \text{ and } \forall xx\colon a, xy\colon a\colon (cR@(cP@xx@xy)) =$
$xy \text{ and } \forall xt\colon a\colon (xt \neq cZ \iff xt = (cP@(cL@xt)@(cR@xt)))) \Rightarrow \forall xt\colon a, xb\colon a\colon (\forall x\colon a \to \$o\colon ((x@cZ \text{ and } \forall xx\colon a\colon ((x@xx) \Rightarrow$
$(x@(cP@xx@cZ) \text{ and } x@(cP@xx@(cP@cZ@cZ))))) \Rightarrow (x@xb)) \Rightarrow \exists xu\colon a\colon (\exists xb_0\colon a, xu_0\colon a\colon ((cP@xb@xu) =$
$(cP@xb_0@xu_0) \text{ and } \forall x\colon a \to \$o\colon ((x@(cP@cZ@xt) \text{ and } \forall xc\colon a, xv\colon a\colon ((x@(cP@xc@xv)) \Rightarrow (x@(cP@(cP@xc@cZ)@(cL@xv))$
$(x@(cP@xb_0@xu_0)))) \text{ and } \forall xv\colon a\colon (\exists xb_1\colon a, xu_0\colon a\colon ((cP@xb@xv) = (cP@xb_1@xu_0) \text{ and } \forall x\colon a \to \$o\colon ((x@(cP@cZ@xt) \text{ and } \forall x$

$(x@(\mathrm{cP}@(\mathrm{cP}@\mathrm{xc}@\mathrm{cZ})@(\mathrm{cL}@\mathrm{xv}_0))$ and $x@(\mathrm{cP}@(\mathrm{cP}@\mathrm{xc}@(\mathrm{cP}@\mathrm{cZ}@\mathrm{cZ}))@(\mathrm{cR}@\mathrm{xv}_0))))) \Rightarrow (x@(\mathrm{cP}@\mathrm{xb}_1@\mathrm{xu}_0)))) \Rightarrow \mathrm{xu} = \mathrm{xv})))$ thf(cPU_LEM6_pme, conjecture)

ALG297^5.p TPS problem from S-SEQ-THMS
a: \$tType thf(a_type, type)
cP: $a \to a \to a$ thf(cP, type)
cZ: a thf(cZ, type)
cR: $a \to a$ thf(cR, type)
cL: $a \to a$ thf(cL, type)
t: a thf(t, type)
$((\mathrm{cL}@\mathrm{cZ}) = \mathrm{cZ}$ and $(\mathrm{cR}@\mathrm{cZ}) = \mathrm{cZ}$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: (\mathrm{cL}@(\mathrm{cP}@\mathrm{xx}@\mathrm{xy})) = \mathrm{xx}$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: (\mathrm{cR}@(\mathrm{cP}@\mathrm{xx}@\mathrm{xy})) = \mathrm{xy}$ and $\forall \mathrm{xt}_0: a: (\mathrm{xt}_0 \neq \mathrm{cZ} \iff \mathrm{xt}_0 = (\mathrm{cP}@(\mathrm{cL}@\mathrm{xt}_0)@(\mathrm{cR}@\mathrm{xt}_0)))) \Rightarrow \forall \mathrm{xs}: a: (\forall x: a \to \$o: ((x@\mathrm{cZ}$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: ((x@\mathrm{xx}$
$(x@(\mathrm{cP}@\mathrm{xx}@\mathrm{xy})))) \Rightarrow (x@\mathrm{xs})) \Rightarrow \forall \mathrm{xb}: a: (\forall x: a \to \$o: ((x@\mathrm{cZ}$ and $\forall \mathrm{xx}: a: ((x@\mathrm{xx}) \Rightarrow (x@(\mathrm{cP}@\mathrm{xx}@\mathrm{cZ})$ and $x@(\mathrm{cP}@\mathrm{xx}@$
$(x@\mathrm{xb})) \Rightarrow \forall \mathrm{xu}: a: (\exists \mathrm{xb}_9: a, \mathrm{xu}_{13}: a: ((\mathrm{cP}@\mathrm{xb}@\mathrm{xu}) = (\mathrm{cP}@\mathrm{xb}_9@\mathrm{xu}_{13})$ and $\forall x: a \to \$o: ((x@(\mathrm{cP}@\mathrm{cZ}@t)$ and $\forall \mathrm{xc}: a, \mathrm{xv}: a: ((x$
$(x@(\mathrm{cP}@(\mathrm{cP}@\mathrm{xc}@\mathrm{cZ})@(\mathrm{cL}@\mathrm{xv}))$ and $x@(\mathrm{cP}@(\mathrm{cP}@\mathrm{xc}@(\mathrm{cP}@\mathrm{cZ}@\mathrm{cZ}))@(\mathrm{cR}@\mathrm{xv}))))) \Rightarrow (x@(\mathrm{cP}@\mathrm{xb}_9@\mathrm{xu}_{13})))) \Rightarrow$
$\forall x: a \to \$o: ((x@\mathrm{cZ}$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: ((x@\mathrm{xx}$ and $x@\mathrm{xy}) \Rightarrow (x@(\mathrm{cP}@\mathrm{xx}@\mathrm{xy})))) \Rightarrow (x@\mathrm{xu})))))$ thf(cPU_LEM7_pme, co

ALG298^5.p TPS problem THM270
c: \$tType thf(c_type, type)
b: \$tType thf(b_type, type)
a: \$tType thf(a_type, type)
c_starc: $c \to c \to c$ thf(c_starc, type)
c_starb: $b \to b \to b$ thf(c_starb, type)
c_stara: $a \to a \to a$ thf(c_stara, type)
$\forall \mathrm{xf}: a \to b, \mathrm{xg}: a \to c, \mathrm{xh}: b \to c: ((\forall \mathrm{xx}: a: (\mathrm{xh}@(\mathrm{xf}@\mathrm{xx})) = (\mathrm{xg}@\mathrm{xx})$ and $\forall \mathrm{xy}: b: \exists \mathrm{xx}: a: (\mathrm{xf}@\mathrm{xx}) = \mathrm{xy}$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: (\mathrm{xf}@($
$(\mathrm{c\_starb}@(\mathrm{xf}@\mathrm{xx})@(\mathrm{xf}@\mathrm{xy}))$ and $\forall \mathrm{xx}: a, \mathrm{xy}: a: (\mathrm{xg}@(\mathrm{c\_stara}@\mathrm{xx}@\mathrm{xy})) = (\mathrm{c\_starc}@(\mathrm{xg}@\mathrm{xx})@(\mathrm{xg}@\mathrm{xy}))) \Rightarrow \forall \mathrm{xx}: b, \mathrm{xy}: b: (\mathrm{xh}@$
$(\mathrm{c\_starc}@(\mathrm{xh}@\mathrm{xx})@(\mathrm{xh}@\mathrm{xy})))$ thf(cTHM270_pme, conjecture)

ALG299-1.p An equational theory with no nontrivial finite models
A classical example of an equational theory with no nontrivial finite models (found idependently by Tarski, Jonsson, Skornyakov and others).
$f(a \cdot b) = a$ cnf(sos_{01}, axiom)
$g(a \cdot b) = b$ cnf(sos_{02}, axiom)
$\mathrm{tptp}_1 \neq \mathrm{tptp}_0$ cnf(sos_{03}, axiom)

ALG300-1.p Identity with no nontrivial finite model
One of the two shortest identities with no nontrivial finite models (in a single binary operation).
$(((a \cdot a) \cdot a) \cdot b) \cdot (a \cdot c) = b$ cnf(sos_{01}, axiom)
$\mathrm{tptp}_1 \neq \mathrm{tptp}_0$ cnf(sos_{02}, axiom)

ALG301-1.p Identity with no nontrivial finite model
One of the two shortest identities with no nontrivial finite models (in a single binary operation).
$a \cdot (a \cdot (a \cdot (b \cdot (c \cdot a)))) = b$ cnf(sos_{01}, axiom)
$\mathrm{tptp}_1 \neq \mathrm{tptp}_0$ cnf(sos_{02}, axiom)

ALG302-1.p Austin's identity
$(((a \cdot a) \cdot a) \cdot b) \cdot (((a \cdot a) \cdot ((a \cdot a) \cdot a)) \cdot c) = b$ cnf(sos_{01}, axiom)
$\mathrm{tptp}_1 \neq \mathrm{tptp}_0$ cnf(sos_{02}, axiom)

ALG305-1.p Random graph 3, nu5 polymorphism
$t(y, x, x, x, x) = x$ cnf($\mathrm{polynu5}_{01}$, axiom)
$t(x, y, x, x, x) = x$ cnf($\mathrm{polynu5}_{02}$, axiom)
$t(x, x, y, x, x) = x$ cnf($\mathrm{polynu5}_{03}$, axiom)
$t(x, x, x, y, x) = x$ cnf($\mathrm{polynu5}_{04}$, axiom)
$t(x, x, x, x, y) = x$ cnf($\mathrm{polynu5}_{05}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf
$\neg\, \mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n_0, axiom)
$\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n_1, axiom)
$\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n_2, axiom)
$\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n_3, axiom)
$\mathrm{gr}(n_0, n_4)$ cnf(graph_n0_n_4, axiom)
$\neg\, \mathrm{gr}(n_1, n_0)$ cnf(graph_n1_n_0, axiom)
$\neg\, \mathrm{gr}(n_1, n_1)$ cnf(graph_n1_n_1, axiom)

$\neg \mathrm{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg \mathrm{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\neg \mathrm{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\mathrm{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\mathrm{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\neg \mathrm{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\mathrm{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg \mathrm{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\neg \mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ cnf(elems, axiom)

ALG306-1.p Random graph 4, edge5 polymorphism
$t(y, y, x, x, x) = x$ cnf(polyedge5$_{01}$, axiom)
$t(y, x, y, x, x) = x$ cnf(polyedge5$_{02}$, axiom)
$t(x, x, x, y, x) = x$ cnf(polyedge5$_{03}$, axiom)
$t(x, x, x, x, y) = x$ cnf(polyedge5$_{04}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf
$\neg \mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)
$\neg \mathrm{gr}(n_0, n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg \mathrm{gr}(n_1, n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg \mathrm{gr}(n_1, n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg \mathrm{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\mathrm{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\neg \mathrm{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\neg \mathrm{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\mathrm{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\mathrm{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)

$\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ cnf(elems, axiom)

ALG307-1.p Random graph 5, nu5 polymorphism
$t(y, x, x, x, x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x, y, x, x, x) = x$ cnf(polynu5$_{02}$, axiom)
$t(x, x, y, x, x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x, x, x, y, x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x, x, x, x, y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf
$\neg\,\mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)
$\mathrm{gr}(n_0, n_4)$ cnf(graph_n0_n$_4$, axiom)
$\mathrm{gr}(n_1, n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_1, n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\mathrm{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\mathrm{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\mathrm{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\mathrm{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ cnf(elems, axiom)

ALG308-1.p Random graph 6, nu5 polymorphism
$t(y, x, x, x, x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x, y, x, x, x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x,x,y,x,x)=x \qquad \mathrm{cnf}(\mathrm{polynu5}_{03},\mathrm{axiom})$
$t(x,x,x,y,x)=x \qquad \mathrm{cnf}(\mathrm{polynu5}_{04},\mathrm{axiom})$
$t(x,x,x,x,y)=x \qquad \mathrm{cnf}(\mathrm{polynu5}_{05},\mathrm{axiom})$
$(\mathrm{gr}(x_0,x_1)$ and $\mathrm{gr}(x_2,x_3)$ and $\mathrm{gr}(x_4,x_5)$ and $\mathrm{gr}(x_6,x_7)$ and $\mathrm{gr}(x_8,x_9)) \Rightarrow \mathrm{gr}(t(x_0,x_2,x_4,x_6,x_8),t(x_1,x_3,x_5,x_7,x_9)) \qquad$ cnf(
$\mathrm{gr}(n_0,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_0,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_1,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_2,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_3,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_4,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n0\_n}_5,\mathrm{axiom})$
$\mathrm{gr}(n_1,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_1,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_1,\mathrm{axiom})$
$\mathrm{gr}(n_1,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_2,\mathrm{axiom})$
$\mathrm{gr}(n_1,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_3,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_4,\mathrm{axiom})$
$\mathrm{gr}(n_1,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n1\_n}_5,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_2,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_1,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_2,\mathrm{axiom})$
$\mathrm{gr}(n_2,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_3,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_4,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n2\_n}_5,\mathrm{axiom})$
$\mathrm{gr}(n_3,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_3,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_1,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_2,\mathrm{axiom})$
$\mathrm{gr}(n_3,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_3,\mathrm{axiom})$
$\mathrm{gr}(n_3,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_4,\mathrm{axiom})$
$\mathrm{gr}(n_3,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n3\_n}_5,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_4,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_1,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_2,\mathrm{axiom})$
$\mathrm{gr}(n_4,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_3,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_4,\mathrm{axiom})$
$\mathrm{gr}(n_4,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n4\_n}_5,\mathrm{axiom})$
$\mathrm{gr}(n_5,n_0) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_0,\mathrm{axiom})$
$\mathrm{gr}(n_5,n_1) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_1,\mathrm{axiom})$
$\mathrm{gr}(n_5,n_2) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_2,\mathrm{axiom})$
$\mathrm{gr}(n_5,n_3) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_3,\mathrm{axiom})$
$\mathrm{gr}(n_5,n_4) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_4,\mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5,n_5) \qquad \mathrm{cnf}(\mathrm{graph\_n5\_n}_5,\mathrm{axiom})$
$n_0 \neq n_1 \qquad \mathrm{cnf}(\mathrm{elems\_n0\_n}_1,\mathrm{axiom})$
$n_0 \neq n_2 \qquad \mathrm{cnf}(\mathrm{elems\_n0\_n}_2,\mathrm{axiom})$
$n_0 \neq n_3 \qquad \mathrm{cnf}(\mathrm{elems\_n0\_n}_3,\mathrm{axiom})$
$n_0 \neq n_4 \qquad \mathrm{cnf}(\mathrm{elems\_n0\_n}_4,\mathrm{axiom})$
$n_0 \neq n_5 \qquad \mathrm{cnf}(\mathrm{elems\_n0\_n}_5,\mathrm{axiom})$
$n_1 \neq n_2 \qquad \mathrm{cnf}(\mathrm{elems\_n1\_n}_2,\mathrm{axiom})$
$n_1 \neq n_3 \qquad \mathrm{cnf}(\mathrm{elems\_n1\_n}_3,\mathrm{axiom})$
$n_1 \neq n_4 \qquad \mathrm{cnf}(\mathrm{elems\_n1\_n}_4,\mathrm{axiom})$
$n_1 \neq n_5 \qquad \mathrm{cnf}(\mathrm{elems\_n1\_n}_5,\mathrm{axiom})$
$n_2 \neq n_3 \qquad \mathrm{cnf}(\mathrm{elems\_n2\_n}_3,\mathrm{axiom})$
$n_2 \neq n_4 \qquad \mathrm{cnf}(\mathrm{elems\_n2\_n}_4,\mathrm{axiom})$
$n_2 \neq n_5 \qquad \mathrm{cnf}(\mathrm{elems\_n2\_n}_5,\mathrm{axiom})$
$n_3 \neq n_4 \qquad \mathrm{cnf}(\mathrm{elems\_n3\_n}_4,\mathrm{axiom})$
$n_3 \neq n_5 \qquad \mathrm{cnf}(\mathrm{elems\_n3\_n}_5,\mathrm{axiom})$
$n_4 \neq n_5 \qquad \mathrm{cnf}(\mathrm{elems\_n4\_n}_5,\mathrm{axiom})$
$x=n_0$ or $x=n_1$ or $x=n_2$ or $x=n_3$ or $x=n_4$ or $x=n_5 \qquad \mathrm{cnf}(\mathrm{elems},\mathrm{axiom})$

ALG309-1.p Random graph 7, nu5 polymorphism
$t(y,x,x,x,x)=x \qquad \mathrm{cnf}(\mathrm{polynu5}_{01},\mathrm{axiom})$
$t(x,y,x,x,x)=x \qquad \mathrm{cnf}(\mathrm{polynu5}_{02},\mathrm{axiom})$

$t(x,x,y,x,x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x,x,x,y,x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x,x,x,x,y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0,x_1)$ and $\mathrm{gr}(x_2,x_3)$ and $\mathrm{gr}(x_4,x_5)$ and $\mathrm{gr}(x_6,x_7)$ and $\mathrm{gr}(x_8,x_9)) \Rightarrow \mathrm{gr}(t(x_0,x_2,x_4,x_6,x_8), t(x_1,x_3,x_5,x_7,x_9))$ cnf
$\mathrm{gr}(n_0,n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_0,n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0,n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_0,n_3)$ cnf(graph_n0_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_0,n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0,n_5)$ cnf(graph_n0_n$_5$, axiom)
$\mathrm{gr}(n_1,n_0)$ cnf(graph_n1_n$_0$, axiom)
$\mathrm{gr}(n_1,n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1,n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_1,n_3)$ cnf(graph_n1_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_1,n_4)$ cnf(graph_n1_n$_4$, axiom)
$\mathrm{gr}(n_1,n_5)$ cnf(graph_n1_n$_5$, axiom)
$\mathrm{gr}(n_2,n_0)$ cnf(graph_n2_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_2,n_1)$ cnf(graph_n2_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_2,n_2)$ cnf(graph_n2_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_2,n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_2,n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_2,n_5)$ cnf(graph_n2_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_3,n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3,n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3,n_2)$ cnf(graph_n3_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_3,n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3,n_4)$ cnf(graph_n3_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_3,n_5)$ cnf(graph_n3_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_4,n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4,n_1)$ cnf(graph_n4_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_4,n_2)$ cnf(graph_n4_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_4,n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4,n_4)$ cnf(graph_n4_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_4,n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_5,n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5,n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_5,n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5,n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5,n_4)$ cnf(graph_n5_n$_4$, axiom)
$\mathrm{gr}(n_5,n_5)$ cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ cnf(elems, axiom)

ALG310-1.p Random graph 8, nu5 polymorphism
$t(y,x,x,x,x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x,y,x,x,x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x,x,y,x,x)=x$ cnf(polynu5$_{03}$, axiom)
$t(x,x,x,y,x)=x$ cnf(polynu5$_{04}$, axiom)
$t(x,x,x,x,y)=x$ cnf(polynu5$_{05}$, axiom)
(gr(x_0,x_1) and gr(x_2,x_3) and gr(x_4,x_5) and gr(x_6,x_7) and gr(x_8,x_9)) $\Rightarrow$ gr$(t(x_0,x_2,x_4,x_6,x_8),t(x_1,x_3,x_5,x_7,x_9))$ cnf(
$\neg$ gr(n_0,n_0) cnf(graph_n0_n$_0$, axiom)
$\neg$ gr(n_0,n_1) cnf(graph_n0_n$_1$, axiom)
gr(n_0,n_2) cnf(graph_n0_n$_2$, axiom)
gr(n_0,n_3) cnf(graph_n0_n$_3$, axiom)
gr(n_0,n_4) cnf(graph_n0_n$_4$, axiom)
$\neg$ gr(n_0,n_5) cnf(graph_n0_n$_5$, axiom)
$\neg$ gr(n_1,n_0) cnf(graph_n1_n$_0$, axiom)
$\neg$ gr(n_1,n_1) cnf(graph_n1_n$_1$, axiom)
gr(n_1,n_2) cnf(graph_n1_n$_2$, axiom)
gr(n_1,n_3) cnf(graph_n1_n$_3$, axiom)
gr(n_1,n_4) cnf(graph_n1_n$_4$, axiom)
$\neg$ gr(n_1,n_5) cnf(graph_n1_n$_5$, axiom)
$\neg$ gr(n_2,n_0) cnf(graph_n2_n$_0$, axiom)
gr(n_2,n_1) cnf(graph_n2_n$_1$, axiom)
gr(n_2,n_2) cnf(graph_n2_n$_2$, axiom)
gr(n_2,n_3) cnf(graph_n2_n$_3$, axiom)
gr(n_2,n_4) cnf(graph_n2_n$_4$, axiom)
gr(n_2,n_5) cnf(graph_n2_n$_5$, axiom)
gr(n_3,n_0) cnf(graph_n3_n$_0$, axiom)
gr(n_3,n_1) cnf(graph_n3_n$_1$, axiom)
$\neg$ gr(n_3,n_2) cnf(graph_n3_n$_2$, axiom)
$\neg$ gr(n_3,n_3) cnf(graph_n3_n$_3$, axiom)
$\neg$ gr(n_3,n_4) cnf(graph_n3_n$_4$, axiom)
gr(n_3,n_5) cnf(graph_n3_n$_5$, axiom)
gr(n_4,n_0) cnf(graph_n4_n$_0$, axiom)
gr(n_4,n_1) cnf(graph_n4_n$_1$, axiom)
gr(n_4,n_2) cnf(graph_n4_n$_2$, axiom)
gr(n_4,n_3) cnf(graph_n4_n$_3$, axiom)
$\neg$ gr(n_4,n_4) cnf(graph_n4_n$_4$, axiom)
gr(n_4,n_5) cnf(graph_n4_n$_5$, axiom)
$\neg$ gr(n_5,n_0) cnf(graph_n5_n$_0$, axiom)
$\neg$ gr(n_5,n_1) cnf(graph_n5_n$_1$, axiom)
gr(n_5,n_2) cnf(graph_n5_n$_2$, axiom)
gr(n_5,n_3) cnf(graph_n5_n$_3$, axiom)
gr(n_5,n_4) cnf(graph_n5_n$_4$, axiom)
$\neg$ gr(n_5,n_5) cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x=n_0$ or $x=n_1$ or $x=n_2$ or $x=n_3$ or $x=n_4$ or $x=n_5$ cnf(elems, axiom)

ALG311-1.p Random graph 9, nu5 polymorphism
$t(y,x,x,x,x)=x$ cnf(polynu5$_{01}$, axiom)
$t(x,y,x,x,x)=x$ cnf(polynu5$_{02}$, axiom)

$t(x,x,y,x,x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x,x,x,y,x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x,x,x,x,y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0,x_1)$ and $\mathrm{gr}(x_2,x_3)$ and $\mathrm{gr}(x_4,x_5)$ and $\mathrm{gr}(x_6,x_7)$ and $\mathrm{gr}(x_8,x_9)) \Rightarrow \mathrm{gr}(t(x_0,x_2,x_4,x_6,x_8), t(x_1,x_3,x_5,x_7,x_9))$ cnf
$\neg\,\mathrm{gr}(n_0,n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_0,n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0,n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_0,n_3)$ cnf(graph_n0_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_0,n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0,n_5)$ cnf(graph_n0_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_1,n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_1,n_1)$ cnf(graph_n1_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_1,n_2)$ cnf(graph_n1_n$_2$, axiom)
$\mathrm{gr}(n_1,n_3)$ cnf(graph_n1_n$_3$, axiom)
$\mathrm{gr}(n_1,n_4)$ cnf(graph_n1_n$_4$, axiom)
$\mathrm{gr}(n_1,n_5)$ cnf(graph_n1_n$_5$, axiom)
$\mathrm{gr}(n_2,n_0)$ cnf(graph_n2_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_2,n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2,n_2)$ cnf(graph_n2_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_2,n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_2,n_4)$ cnf(graph_n2_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_2,n_5)$ cnf(graph_n2_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_3,n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3,n_1)$ cnf(graph_n3_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_3,n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3,n_3)$ cnf(graph_n3_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_3,n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_3,n_5)$ cnf(graph_n3_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_4,n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4,n_1)$ cnf(graph_n4_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_4,n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4,n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4,n_4)$ cnf(graph_n4_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_4,n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_5,n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5,n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_5,n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5,n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5,n_4)$ cnf(graph_n5_n$_4$, axiom)
$\mathrm{gr}(n_5,n_5)$ cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ cnf(elems, axiom)

ALG312-1.p Random graph 10, nu5 polymorphism
$t(y,x,x,x,x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x,y,x,x,x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x, x, y, x, x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x, x, x, y, x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x, x, x, x, y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf
$\neg\,\mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)
$\mathrm{gr}(n_0, n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0, n_5)$ cnf(graph_n0_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_1, n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_1, n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_1, n_5)$ cnf(graph_n1_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\mathrm{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_2, n_5)$ cnf(graph_n2_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_3, n_5)$ cnf(graph_n3_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$\mathrm{gr}(n_4, n_5)$ cnf(graph_n4_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_5, n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5, n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_5, n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5, n_3)$ cnf(graph_n5_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_5, n_4)$ cnf(graph_n5_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_5, n_5)$ cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ cnf(elems, axiom)

ALG313-1.p Random graph 11, nu5 polymorphism
$t(y, x, x, x, x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x, y, x, x, x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x, x, y, x, x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x, x, x, y, x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x, x, x, x, y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf
$\neg\,\mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_0, n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0, n_5)$ cnf(graph_n0_n$_5$, axiom)
$\mathrm{gr}(n_1, n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_1, n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\mathrm{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\mathrm{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_1, n_5)$ cnf(graph_n1_n$_5$, axiom)
$\mathrm{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\mathrm{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\mathrm{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\mathrm{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_2, n_5)$ cnf(graph_n2_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_3, n_5)$ cnf(graph_n3_n$_5$, axiom)
$\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_4, n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_5, n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5, n_1)$ cnf(graph_n5_n$_1$, axiom)
$\mathrm{gr}(n_5, n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5, n_3)$ cnf(graph_n5_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_5, n_4)$ cnf(graph_n5_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_5, n_5)$ cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ cnf(elems, axiom)

ALG314-1.p Random graph 12, nu5 polymorphism
$t(y, x, x, x, x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x, y, x, x, x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x,x,y,x,x) = x$ cnf(polynu5$_{03}$, axiom)
$t(x,x,x,y,x) = x$ cnf(polynu5$_{04}$, axiom)
$t(x,x,x,x,y) = x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0,x_1)$ and $\mathrm{gr}(x_2,x_3)$ and $\mathrm{gr}(x_4,x_5)$ and $\mathrm{gr}(x_6,x_7)$ and $\mathrm{gr}(x_8,x_9)) \Rightarrow \mathrm{gr}(t(x_0,x_2,x_4,x_6,x_8), t(x_1,x_3,x_5,x_7,x_9))$ cnf
$\neg\,\mathrm{gr}(n_0,n_0)$ cnf(graph_n0_n$_0$, axiom)
$\mathrm{gr}(n_0,n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0,n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_0,n_3)$ cnf(graph_n0_n$_3$, axiom)
$\mathrm{gr}(n_0,n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0,n_5)$ cnf(graph_n0_n$_5$, axiom)
$\mathrm{gr}(n_1,n_0)$ cnf(graph_n1_n$_0$, axiom)
$\mathrm{gr}(n_1,n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1,n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_1,n_3)$ cnf(graph_n1_n$_3$, axiom)
$\mathrm{gr}(n_1,n_4)$ cnf(graph_n1_n$_4$, axiom)
$\mathrm{gr}(n_1,n_5)$ cnf(graph_n1_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_2,n_0)$ cnf(graph_n2_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_2,n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2,n_2)$ cnf(graph_n2_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_2,n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_2,n_4)$ cnf(graph_n2_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_2,n_5)$ cnf(graph_n2_n$_5$, axiom)
$\mathrm{gr}(n_3,n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3,n_1)$ cnf(graph_n3_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_3,n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3,n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3,n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_3,n_5)$ cnf(graph_n3_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_4,n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4,n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4,n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4,n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4,n_4)$ cnf(graph_n4_n$_4$, axiom)
$\mathrm{gr}(n_4,n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_5,n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5,n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_5,n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5,n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5,n_4)$ cnf(graph_n5_n$_4$, axiom)
$\mathrm{gr}(n_5,n_5)$ cnf(graph_n5_n$_5$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ cnf(elems, axiom)

ALG315-1.p Random graph 13, nu5 polymorphism
$t(y,x,x,x,x) = x$ cnf(polynu5$_{01}$, axiom)
$t(x,y,x,x,x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x,x,y,x,x)=x$ cnf(polynu5$_{03}$, axiom)
$t(x,x,x,y,x)=x$ cnf(polynu5$_{04}$, axiom)
$t(x,x,x,x,y)=x$ cnf(polynu5$_{05}$, axiom)
$(\mathrm{gr}(x_0,x_1)$ and $\mathrm{gr}(x_2,x_3)$ and $\mathrm{gr}(x_4,x_5)$ and $\mathrm{gr}(x_6,x_7)$ and $\mathrm{gr}(x_8,x_9)) \Rightarrow \mathrm{gr}(t(x_0,x_2,x_4,x_6,x_8), t(x_1,x_3,x_5,x_7,x_9))$ cnf
$\neg\,\mathrm{gr}(n_0,n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_0,n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_0,n_2)$ cnf(graph_n0_n$_2$, axiom)
$\mathrm{gr}(n_0,n_3)$ cnf(graph_n0_n$_3$, axiom)
$\mathrm{gr}(n_0,n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_0,n_5)$ cnf(graph_n0_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_0,n_6)$ cnf(graph_n0_n$_6$, axiom)
$\mathrm{gr}(n_1,n_0)$ cnf(graph_n1_n$_0$, axiom)
$\mathrm{gr}(n_1,n_1)$ cnf(graph_n1_n$_1$, axiom)
$\mathrm{gr}(n_1,n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_1,n_3)$ cnf(graph_n1_n$_3$, axiom)
$\mathrm{gr}(n_1,n_4)$ cnf(graph_n1_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_1,n_5)$ cnf(graph_n1_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_1,n_6)$ cnf(graph_n1_n$_6$, axiom)
$\mathrm{gr}(n_2,n_0)$ cnf(graph_n2_n$_0$, axiom)
$\mathrm{gr}(n_2,n_1)$ cnf(graph_n2_n$_1$, axiom)
$\mathrm{gr}(n_2,n_2)$ cnf(graph_n2_n$_2$, axiom)
$\mathrm{gr}(n_2,n_3)$ cnf(graph_n2_n$_3$, axiom)
$\mathrm{gr}(n_2,n_4)$ cnf(graph_n2_n$_4$, axiom)
$\mathrm{gr}(n_2,n_5)$ cnf(graph_n2_n$_5$, axiom)
$\mathrm{gr}(n_2,n_6)$ cnf(graph_n2_n$_6$, axiom)
$\mathrm{gr}(n_3,n_0)$ cnf(graph_n3_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_3,n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3,n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3,n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3,n_4)$ cnf(graph_n3_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_3,n_5)$ cnf(graph_n3_n$_5$, axiom)
$\mathrm{gr}(n_3,n_6)$ cnf(graph_n3_n$_6$, axiom)
$\neg\,\mathrm{gr}(n_4,n_0)$ cnf(graph_n4_n$_0$, axiom)
$\mathrm{gr}(n_4,n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4,n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4,n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4,n_4)$ cnf(graph_n4_n$_4$, axiom)
$\mathrm{gr}(n_4,n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_4,n_6)$ cnf(graph_n4_n$_6$, axiom)
$\mathrm{gr}(n_5,n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5,n_1)$ cnf(graph_n5_n$_1$, axiom)
$\mathrm{gr}(n_5,n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5,n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5,n_4)$ cnf(graph_n5_n$_4$, axiom)
$\mathrm{gr}(n_5,n_5)$ cnf(graph_n5_n$_5$, axiom)
$\mathrm{gr}(n_5,n_6)$ cnf(graph_n5_n$_6$, axiom)
$\mathrm{gr}(n_6,n_0)$ cnf(graph_n6_n$_0$, axiom)
$\mathrm{gr}(n_6,n_1)$ cnf(graph_n6_n$_1$, axiom)
$\mathrm{gr}(n_6,n_2)$ cnf(graph_n6_n$_2$, axiom)
$\mathrm{gr}(n_6,n_3)$ cnf(graph_n6_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_6,n_4)$ cnf(graph_n6_n$_4$, axiom)
$\mathrm{gr}(n_6,n_5)$ cnf(graph_n6_n$_5$, axiom)
$\mathrm{gr}(n_6,n_6)$ cnf(graph_n6_n$_6$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_0 \neq n_6$ cnf(elems_n0_n$_6$, axiom)

$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_1 \neq n_6$ cnf(elems_n1_n$_6$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_2 \neq n_6$ cnf(elems_n2_n$_6$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_3 \neq n_6$ cnf(elems_n3_n$_6$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$n_4 \neq n_6$ cnf(elems_n4_n$_6$, axiom)
$n_5 \neq n_6$ cnf(elems_n5_n$_6$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ cnf(elems, axiom)

ALG316-1.p Random graph 14, siggers polymorphism
$t(x, x, x, x) = x$ cnf(polysiggers$_{01}$, axiom)
$t(x, y, x, z) = t(y, x, z, y)$ cnf(polysiggers$_{02}$, axiom)
$(\text{gr}(x_0, x_1)$ and $\text{gr}(x_2, x_3)$ and $\text{gr}(x_4, x_5)$ and $\text{gr}(x_6, x_7)) \Rightarrow \text{gr}(t(x_0, x_2, x_4, x_6), t(x_1, x_3, x_5, x_7))$ cnf(preserves$_{03}$, axiom)
$\neg\,\text{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\text{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\neg\,\text{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\text{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)
$\neg\,\text{gr}(n_0, n_4)$ cnf(graph_n0_n$_4$, axiom)
$\neg\,\text{gr}(n_0, n_5)$ cnf(graph_n0_n$_5$, axiom)
$\text{gr}(n_0, n_6)$ cnf(graph_n0_n$_6$, axiom)
$\neg\,\text{gr}(n_1, n_0)$ cnf(graph_n1_n$_0$, axiom)
$\neg\,\text{gr}(n_1, n_1)$ cnf(graph_n1_n$_1$, axiom)
$\neg\,\text{gr}(n_1, n_2)$ cnf(graph_n1_n$_2$, axiom)
$\neg\,\text{gr}(n_1, n_3)$ cnf(graph_n1_n$_3$, axiom)
$\neg\,\text{gr}(n_1, n_4)$ cnf(graph_n1_n$_4$, axiom)
$\text{gr}(n_1, n_5)$ cnf(graph_n1_n$_5$, axiom)
$\neg\,\text{gr}(n_1, n_6)$ cnf(graph_n1_n$_6$, axiom)
$\neg\,\text{gr}(n_2, n_0)$ cnf(graph_n2_n$_0$, axiom)
$\text{gr}(n_2, n_1)$ cnf(graph_n2_n$_1$, axiom)
$\text{gr}(n_2, n_2)$ cnf(graph_n2_n$_2$, axiom)
$\neg\,\text{gr}(n_2, n_3)$ cnf(graph_n2_n$_3$, axiom)
$\neg\,\text{gr}(n_2, n_4)$ cnf(graph_n2_n$_4$, axiom)
$\text{gr}(n_2, n_5)$ cnf(graph_n2_n$_5$, axiom)
$\neg\,\text{gr}(n_2, n_6)$ cnf(graph_n2_n$_6$, axiom)
$\neg\,\text{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\neg\,\text{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\neg\,\text{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\neg\,\text{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\neg\,\text{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\neg\,\text{gr}(n_3, n_5)$ cnf(graph_n3_n$_5$, axiom)
$\text{gr}(n_3, n_6)$ cnf(graph_n3_n$_6$, axiom)
$\neg\,\text{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\neg\,\text{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\neg\,\text{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\neg\,\text{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\text{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$\neg\,\text{gr}(n_4, n_5)$ cnf(graph_n4_n$_5$, axiom)
$\neg\,\text{gr}(n_4, n_6)$ cnf(graph_n4_n$_6$, axiom)
$\neg\,\text{gr}(n_5, n_0)$ cnf(graph_n5_n$_0$, axiom)
$\neg\,\text{gr}(n_5, n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\text{gr}(n_5, n_2)$ cnf(graph_n5_n$_2$, axiom)
$\neg\,\text{gr}(n_5, n_3)$ cnf(graph_n5_n$_3$, axiom)

$\neg\,\mathrm{gr}(n_5, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n5\_n}_4, \mathrm{axiom})$

$\mathrm{gr}(n_5, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n5\_n}_5, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_5, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n5\_n}_6, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_0, \mathrm{axiom})$

$\mathrm{gr}(n_6, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_6, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_3, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_4, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_5, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_6, \mathrm{axiom})$

$n_0 \neq n_1$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_1, \mathrm{axiom})$

$n_0 \neq n_2$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_2, \mathrm{axiom})$

$n_0 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_3, \mathrm{axiom})$

$n_0 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_4, \mathrm{axiom})$

$n_0 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_5, \mathrm{axiom})$

$n_0 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_6, \mathrm{axiom})$

$n_1 \neq n_2$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_2, \mathrm{axiom})$

$n_1 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_3, \mathrm{axiom})$

$n_1 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_4, \mathrm{axiom})$

$n_1 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_5, \mathrm{axiom})$

$n_1 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_6, \mathrm{axiom})$

$n_2 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_3, \mathrm{axiom})$

$n_2 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_4, \mathrm{axiom})$

$n_2 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_5, \mathrm{axiom})$

$n_2 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_6, \mathrm{axiom})$

$n_3 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_4, \mathrm{axiom})$

$n_3 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_5, \mathrm{axiom})$

$n_3 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_6, \mathrm{axiom})$

$n_4 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n4\_n}_5, \mathrm{axiom})$

$n_4 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n4\_n}_6, \mathrm{axiom})$

$n_5 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n5\_n}_6, \mathrm{axiom})$

$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ $\mathrm{cnf}(\mathrm{elems}, \mathrm{axiom})$

ALG317-1.p Random graph 15, nu5 polymorphism

$t(y, x, x, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{01}, \mathrm{axiom})$

$t(x, y, x, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{02}, \mathrm{axiom})$

$t(x, x, y, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{03}, \mathrm{axiom})$

$t(x, x, x, y, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{04}, \mathrm{axiom})$

$t(x, x, x, x, y) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{05}, \mathrm{axiom})$

$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf

$\neg\,\mathrm{gr}(n_0, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_0, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_1, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_3, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_4, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_5, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_6, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_0, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_2, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_3, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_4, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_5, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_6, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_0, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_2, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_2, \mathrm{axiom})$

$\mathrm{gr}(n_2, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_3, \mathrm{axiom})$

$\mathrm{gr}(n_2, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_4, \mathrm{axiom})$

$\mathrm{gr}(n_2, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_5, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_6)$ cnf(graph_n2_n$_6$, axiom)
$\mathrm{gr}(n_3, n_0)$ cnf(graph_n3_n$_0$, axiom)
$\mathrm{gr}(n_3, n_1)$ cnf(graph_n3_n$_1$, axiom)
$\mathrm{gr}(n_3, n_2)$ cnf(graph_n3_n$_2$, axiom)
$\mathrm{gr}(n_3, n_3)$ cnf(graph_n3_n$_3$, axiom)
$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\mathrm{gr}(n_3, n_5)$ cnf(graph_n3_n$_5$, axiom)
$\mathrm{gr}(n_3, n_6)$ cnf(graph_n3_n$_6$, axiom)
$\neg\,\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$\mathrm{gr}(n_4, n_5)$ cnf(graph_n4_n$_5$, axiom)
$\mathrm{gr}(n_4, n_6)$ cnf(graph_n4_n$_6$, axiom)
$\mathrm{gr}(n_5, n_0)$ cnf(graph_n5_n$_0$, axiom)
$\mathrm{gr}(n_5, n_1)$ cnf(graph_n5_n$_1$, axiom)
$\mathrm{gr}(n_5, n_2)$ cnf(graph_n5_n$_2$, axiom)
$\mathrm{gr}(n_5, n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5, n_4)$ cnf(graph_n5_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_5, n_5)$ cnf(graph_n5_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_5, n_6)$ cnf(graph_n5_n$_6$, axiom)
$\mathrm{gr}(n_6, n_0)$ cnf(graph_n6_n$_0$, axiom)
$\mathrm{gr}(n_6, n_1)$ cnf(graph_n6_n$_1$, axiom)
$\mathrm{gr}(n_6, n_2)$ cnf(graph_n6_n$_2$, axiom)
$\mathrm{gr}(n_6, n_3)$ cnf(graph_n6_n$_3$, axiom)
$\mathrm{gr}(n_6, n_4)$ cnf(graph_n6_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_6, n_5)$ cnf(graph_n6_n$_5$, axiom)
$\mathrm{gr}(n_6, n_6)$ cnf(graph_n6_n$_6$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_0 \neq n_6$ cnf(elems_n0_n$_6$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_1 \neq n_6$ cnf(elems_n1_n$_6$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_2 \neq n_6$ cnf(elems_n2_n$_6$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_3 \neq n_6$ cnf(elems_n3_n$_6$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$n_4 \neq n_6$ cnf(elems_n4_n$_6$, axiom)
$n_5 \neq n_6$ cnf(elems_n5_n$_6$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ cnf(elems, axiom)

ALG319-1.p Random graph 17, siggers polymorphism
$t(x, x, x, x) = x$ cnf(polysiggers$_{01}$, axiom)
$t(x, y, x, z) = t(y, x, z, y)$ cnf(polysiggers$_{02}$, axiom)
$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6), t(x_1, x_3, x_5, x_7))$ cnf(preserves, axiom)
$\neg\,\mathrm{gr}(n_0, n_0)$ cnf(graph_n0_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_0, n_1)$ cnf(graph_n0_n$_1$, axiom)
$\mathrm{gr}(n_0, n_2)$ cnf(graph_n0_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_0, n_3)$ cnf(graph_n0_n$_3$, axiom)

$\neg\,\mathrm{gr}(n_0, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n0\_n_4}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n0\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_0, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n0\_n_6}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_1}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_2}, \mathrm{axiom})$
$\mathrm{gr}(n_1, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_4}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_1, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n1\_n_6}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_1}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_2}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_4}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_2, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_5}, \mathrm{axiom})$
$\mathrm{gr}(n_2, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n2\_n_6}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_1}, \mathrm{axiom})$
$\mathrm{gr}(n_3, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_2}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_4}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_3, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n3\_n_6}, \mathrm{axiom})$
$\mathrm{gr}(n_4, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_1}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_2}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_4}, \mathrm{axiom})$
$\mathrm{gr}(n_4, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_4, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n4\_n_6}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_1}, \mathrm{axiom})$
$\mathrm{gr}(n_5, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_2}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_4}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_5, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n5\_n_6}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_0)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_0}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_1)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_1}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_2)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_2}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_3)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_3}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_4)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_4}, \mathrm{axiom})$
$\mathrm{gr}(n_6, n_5)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_5}, \mathrm{axiom})$
$\neg\,\mathrm{gr}(n_6, n_6)$	$\mathrm{cnf}(\mathrm{graph\_n6\_n_6}, \mathrm{axiom})$
$n_0 \neq n_1$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_1}, \mathrm{axiom})$
$n_0 \neq n_2$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_2}, \mathrm{axiom})$
$n_0 \neq n_3$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_3}, \mathrm{axiom})$
$n_0 \neq n_4$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_4}, \mathrm{axiom})$
$n_0 \neq n_5$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_5}, \mathrm{axiom})$
$n_0 \neq n_6$	$\mathrm{cnf}(\mathrm{elems\_n0\_n_6}, \mathrm{axiom})$
$n_1 \neq n_2$	$\mathrm{cnf}(\mathrm{elems\_n1\_n_2}, \mathrm{axiom})$
$n_1 \neq n_3$	$\mathrm{cnf}(\mathrm{elems\_n1\_n_3}, \mathrm{axiom})$
$n_1 \neq n_4$	$\mathrm{cnf}(\mathrm{elems\_n1\_n_4}, \mathrm{axiom})$
$n_1 \neq n_5$	$\mathrm{cnf}(\mathrm{elems\_n1\_n_5}, \mathrm{axiom})$
$n_1 \neq n_6$	$\mathrm{cnf}(\mathrm{elems\_n1\_n_6}, \mathrm{axiom})$
$n_2 \neq n_3$	$\mathrm{cnf}(\mathrm{elems\_n2\_n_3}, \mathrm{axiom})$
$n_2 \neq n_4$	$\mathrm{cnf}(\mathrm{elems\_n2\_n_4}, \mathrm{axiom})$
$n_2 \neq n_5$	$\mathrm{cnf}(\mathrm{elems\_n2\_n_5}, \mathrm{axiom})$

$n_2 \neq n_6$ cnf(elems_n2_n$_6$, axiom)

$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)

$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)

$n_3 \neq n_6$ cnf(elems_n3_n$_6$, axiom)

$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)

$n_4 \neq n_6$ cnf(elems_n4_n$_6$, axiom)

$n_5 \neq n_6$ cnf(elems_n5_n$_6$, axiom)

$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ cnf(elems, axiom)

ALG320-1.p Random graph 18, nu5 polymorphism

$t(y, x, x, x, x) = x$ cnf(polynu5$_{01}$, axiom)

$t(x, y, x, x, x) = x$ cnf(polynu5$_{02}$, axiom)

$t(x, x, y, x, x) = x$ cnf(polynu5$_{03}$, axiom)

$t(x, x, x, y, x) = x$ cnf(polynu5$_{04}$, axiom)

$t(x, x, x, x, y) = x$ cnf(polynu5$_{05}$, axiom)

(gr(x_0, x_1) and gr(x_2, x_3) and gr(x_4, x_5) and gr(x_6, x_7) and gr(x_8, x_9)) $\Rightarrow$ gr($t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9)$) cnf

$\neg$ gr(n_0, n_0) cnf(graph_n0_n$_0$, axiom)

$\neg$ gr(n_0, n_1) cnf(graph_n0_n$_1$, axiom)

$\neg$ gr(n_0, n_2) cnf(graph_n0_n$_2$, axiom)

$\neg$ gr(n_0, n_3) cnf(graph_n0_n$_3$, axiom)

gr(n_0, n_4) cnf(graph_n0_n$_4$, axiom)

gr(n_0, n_5) cnf(graph_n0_n$_5$, axiom)

gr(n_0, n_6) cnf(graph_n0_n$_6$, axiom)

$\neg$ gr(n_1, n_0) cnf(graph_n1_n$_0$, axiom)

gr(n_1, n_1) cnf(graph_n1_n$_1$, axiom)

gr(n_1, n_2) cnf(graph_n1_n$_2$, axiom)

gr(n_1, n_3) cnf(graph_n1_n$_3$, axiom)

$\neg$ gr(n_1, n_4) cnf(graph_n1_n$_4$, axiom)

$\neg$ gr(n_1, n_5) cnf(graph_n1_n$_5$, axiom)

gr(n_1, n_6) cnf(graph_n1_n$_6$, axiom)

$\neg$ gr(n_2, n_0) cnf(graph_n2_n$_0$, axiom)

$\neg$ gr(n_2, n_1) cnf(graph_n2_n$_1$, axiom)

gr(n_2, n_2) cnf(graph_n2_n$_2$, axiom)

gr(n_2, n_3) cnf(graph_n2_n$_3$, axiom)

gr(n_2, n_4) cnf(graph_n2_n$_4$, axiom)

gr(n_2, n_5) cnf(graph_n2_n$_5$, axiom)

gr(n_2, n_6) cnf(graph_n2_n$_6$, axiom)

$\neg$ gr(n_3, n_0) cnf(graph_n3_n$_0$, axiom)

$\neg$ gr(n_3, n_1) cnf(graph_n3_n$_1$, axiom)

gr(n_3, n_2) cnf(graph_n3_n$_2$, axiom)

gr(n_3, n_3) cnf(graph_n3_n$_3$, axiom)

gr(n_3, n_4) cnf(graph_n3_n$_4$, axiom)

gr(n_3, n_5) cnf(graph_n3_n$_5$, axiom)

$\neg$ gr(n_3, n_6) cnf(graph_n3_n$_6$, axiom)

gr(n_4, n_0) cnf(graph_n4_n$_0$, axiom)

$\neg$ gr(n_4, n_1) cnf(graph_n4_n$_1$, axiom)

$\neg$ gr(n_4, n_2) cnf(graph_n4_n$_2$, axiom)

gr(n_4, n_3) cnf(graph_n4_n$_3$, axiom)

gr(n_4, n_4) cnf(graph_n4_n$_4$, axiom)

gr(n_4, n_5) cnf(graph_n4_n$_5$, axiom)

$\neg$ gr(n_4, n_6) cnf(graph_n4_n$_6$, axiom)

gr(n_5, n_0) cnf(graph_n5_n$_0$, axiom)

$\neg$ gr(n_5, n_1) cnf(graph_n5_n$_1$, axiom)

gr(n_5, n_2) cnf(graph_n5_n$_2$, axiom)

gr(n_5, n_3) cnf(graph_n5_n$_3$, axiom)

gr(n_5, n_4) cnf(graph_n5_n$_4$, axiom)

gr(n_5, n_5) cnf(graph_n5_n$_5$, axiom)

gr(n_5, n_6) cnf(graph_n5_n$_6$, axiom)

$\neg$ gr(n_6, n_0) cnf(graph_n6_n$_0$, axiom)

$\neg$ gr(n_6, n_1) cnf(graph_n6_n$_1$, axiom)

$\neg\,\mathrm{gr}(n_6, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_3, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_4, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_6, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_5, \mathrm{axiom})$

$\mathrm{gr}(n_6, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n6\_n}_6, \mathrm{axiom})$

$n_0 \neq n_1$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_1, \mathrm{axiom})$

$n_0 \neq n_2$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_2, \mathrm{axiom})$

$n_0 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_3, \mathrm{axiom})$

$n_0 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_4, \mathrm{axiom})$

$n_0 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_5, \mathrm{axiom})$

$n_0 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n0\_n}_6, \mathrm{axiom})$

$n_1 \neq n_2$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_2, \mathrm{axiom})$

$n_1 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_3, \mathrm{axiom})$

$n_1 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_4, \mathrm{axiom})$

$n_1 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_5, \mathrm{axiom})$

$n_1 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n1\_n}_6, \mathrm{axiom})$

$n_2 \neq n_3$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_3, \mathrm{axiom})$

$n_2 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_4, \mathrm{axiom})$

$n_2 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_5, \mathrm{axiom})$

$n_2 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n2\_n}_6, \mathrm{axiom})$

$n_3 \neq n_4$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_4, \mathrm{axiom})$

$n_3 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_5, \mathrm{axiom})$

$n_3 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n3\_n}_6, \mathrm{axiom})$

$n_4 \neq n_5$ $\mathrm{cnf}(\mathrm{elems\_n4\_n}_5, \mathrm{axiom})$

$n_4 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n4\_n}_6, \mathrm{axiom})$

$n_5 \neq n_6$ $\mathrm{cnf}(\mathrm{elems\_n5\_n}_6, \mathrm{axiom})$

$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ $\mathrm{cnf}(\mathrm{elems}, \mathrm{axiom})$

ALG321-1.p Random graph 19, nu5 polymorphism

$t(y, x, x, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{01}, \mathrm{axiom})$

$t(x, y, x, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{02}, \mathrm{axiom})$

$t(x, x, y, x, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{03}, \mathrm{axiom})$

$t(x, x, x, y, x) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{04}, \mathrm{axiom})$

$t(x, x, x, x, y) = x$ $\mathrm{cnf}(\mathrm{polynu5}_{05}, \mathrm{axiom})$

$(\mathrm{gr}(x_0, x_1)$ and $\mathrm{gr}(x_2, x_3)$ and $\mathrm{gr}(x_4, x_5)$ and $\mathrm{gr}(x_6, x_7)$ and $\mathrm{gr}(x_8, x_9)) \Rightarrow \mathrm{gr}(t(x_0, x_2, x_4, x_6, x_8), t(x_1, x_3, x_5, x_7, x_9))$ cnf

$\neg\,\mathrm{gr}(n_0, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_0, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_2, \mathrm{axiom})$

$\mathrm{gr}(n_0, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_3, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_4, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_5, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_0, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n0\_n}_6, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_1, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_0, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_1, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_1, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_3, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_1, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_4, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_1, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_5, \mathrm{axiom})$

$\mathrm{gr}(n_1, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n1\_n}_6, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_0, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_1, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_3, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_4)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_4, \mathrm{axiom})$

$\mathrm{gr}(n_2, n_5)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_5, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_2, n_6)$ $\mathrm{cnf}(\mathrm{graph\_n2\_n}_6, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_3, n_0)$ $\mathrm{cnf}(\mathrm{graph\_n3\_n}_0, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_3, n_1)$ $\mathrm{cnf}(\mathrm{graph\_n3\_n}_1, \mathrm{axiom})$

$\mathrm{gr}(n_3, n_2)$ $\mathrm{cnf}(\mathrm{graph\_n3\_n}_2, \mathrm{axiom})$

$\neg\,\mathrm{gr}(n_3, n_3)$ $\mathrm{cnf}(\mathrm{graph\_n3\_n}_3, \mathrm{axiom})$

$\mathrm{gr}(n_3, n_4)$ cnf(graph_n3_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_3, n_5)$ cnf(graph_n3_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_3, n_6)$ cnf(graph_n3_n$_6$, axiom)
$\neg\,\mathrm{gr}(n_4, n_0)$ cnf(graph_n4_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_4, n_1)$ cnf(graph_n4_n$_1$, axiom)
$\mathrm{gr}(n_4, n_2)$ cnf(graph_n4_n$_2$, axiom)
$\mathrm{gr}(n_4, n_3)$ cnf(graph_n4_n$_3$, axiom)
$\mathrm{gr}(n_4, n_4)$ cnf(graph_n4_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_4, n_5)$ cnf(graph_n4_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_4, n_6)$ cnf(graph_n4_n$_6$, axiom)
$\neg\,\mathrm{gr}(n_5, n_0)$ cnf(graph_n5_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_5, n_1)$ cnf(graph_n5_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_5, n_2)$ cnf(graph_n5_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_5, n_3)$ cnf(graph_n5_n$_3$, axiom)
$\mathrm{gr}(n_5, n_4)$ cnf(graph_n5_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_5, n_5)$ cnf(graph_n5_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_5, n_6)$ cnf(graph_n5_n$_6$, axiom)
$\neg\,\mathrm{gr}(n_6, n_0)$ cnf(graph_n6_n$_0$, axiom)
$\neg\,\mathrm{gr}(n_6, n_1)$ cnf(graph_n6_n$_1$, axiom)
$\neg\,\mathrm{gr}(n_6, n_2)$ cnf(graph_n6_n$_2$, axiom)
$\neg\,\mathrm{gr}(n_6, n_3)$ cnf(graph_n6_n$_3$, axiom)
$\neg\,\mathrm{gr}(n_6, n_4)$ cnf(graph_n6_n$_4$, axiom)
$\neg\,\mathrm{gr}(n_6, n_5)$ cnf(graph_n6_n$_5$, axiom)
$\neg\,\mathrm{gr}(n_6, n_6)$ cnf(graph_n6_n$_6$, axiom)
$n_0 \neq n_1$ cnf(elems_n0_n$_1$, axiom)
$n_0 \neq n_2$ cnf(elems_n0_n$_2$, axiom)
$n_0 \neq n_3$ cnf(elems_n0_n$_3$, axiom)
$n_0 \neq n_4$ cnf(elems_n0_n$_4$, axiom)
$n_0 \neq n_5$ cnf(elems_n0_n$_5$, axiom)
$n_0 \neq n_6$ cnf(elems_n0_n$_6$, axiom)
$n_1 \neq n_2$ cnf(elems_n1_n$_2$, axiom)
$n_1 \neq n_3$ cnf(elems_n1_n$_3$, axiom)
$n_1 \neq n_4$ cnf(elems_n1_n$_4$, axiom)
$n_1 \neq n_5$ cnf(elems_n1_n$_5$, axiom)
$n_1 \neq n_6$ cnf(elems_n1_n$_6$, axiom)
$n_2 \neq n_3$ cnf(elems_n2_n$_3$, axiom)
$n_2 \neq n_4$ cnf(elems_n2_n$_4$, axiom)
$n_2 \neq n_5$ cnf(elems_n2_n$_5$, axiom)
$n_2 \neq n_6$ cnf(elems_n2_n$_6$, axiom)
$n_3 \neq n_4$ cnf(elems_n3_n$_4$, axiom)
$n_3 \neq n_5$ cnf(elems_n3_n$_5$, axiom)
$n_3 \neq n_6$ cnf(elems_n3_n$_6$, axiom)
$n_4 \neq n_5$ cnf(elems_n4_n$_5$, axiom)
$n_4 \neq n_6$ cnf(elems_n4_n$_6$, axiom)
$n_5 \neq n_6$ cnf(elems_n5_n$_6$, axiom)
$x = n_0$ or $x = n_1$ or $x = n_2$ or $x = n_3$ or $x = n_4$ or $x = n_5$ or $x = n_6$ cnf(elems, axiom)

ALG440-1.p Malcev, wnu2, wnu3 implies majority
$m(a, a, b) = b$ cnf(sos, axiom)
$m(a, b, b) = a$ cnf(sos$_{001}$, axiom)
$u(a, a, a) = a$ cnf(sos$_{002}$, axiom)
$v(a, a) = a$ cnf(sos$_{003}$, axiom)
$u(a, a, b) = u(a, b, a)$ cnf(sos$_{004}$, axiom)
$u(a, a, b) = u(b, a, a)$ cnf(sos$_{005}$, axiom)
$v(a, b) = v(b, a)$ cnf(sos$_{006}$, axiom)
$u(a, a, b) = v(a, b)$ cnf(sos$_{007}$, axiom)
$(r(x_0, x_1, x_2)$ and $r(x_3, x_4, x_5)$ and $r(x_6, x_7, x_8)) \Rightarrow r(m(x_0, x_3, x_6), m(x_1, x_4, x_7), m(x_2, x_5, x_8))$ cnf(sos$_{008}$, axiom)
$(r(x_0, x_1, x_2)$ and $r(x_3, x_4, x_5)$ and $r(x_6, x_7, x_8)) \Rightarrow r(u(x_0, x_3, x_6), u(x_1, x_4, x_7), u(x_2, x_5, x_8))$ cnf(sos$_{009}$, axiom)
$(r(x_0, x_1, x_2)$ and $r(x_3, x_4, x_5)) \Rightarrow r(v(x_0, x_3), v(x_1, x_4), v(x_2, x_5))$ cnf(sos$_{010}$, axiom)
$r(a, a, b)$ cnf(sos$_{011}$, axiom)

$r(a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{012}, \mathrm{axiom})$
$r(b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{013}, \mathrm{axiom})$
$\neg\, r(a, a, a) \quad \mathrm{cnf}(\mathrm{goals}, \mathrm{negated\_conjecture})$

ALG441-1.p Malcev, wnu2, wnu4 implies majority
$m(a, a, b) = b \quad \mathrm{cnf}(\mathrm{sos}, \mathrm{axiom})$
$m(a, b, b) = a \quad \mathrm{cnf}(\mathrm{sos}_{001}, \mathrm{axiom})$
$u(a, a) = a \quad \mathrm{cnf}(\mathrm{sos}_{002}, \mathrm{axiom})$
$v(a, a, a, a) = a \quad \mathrm{cnf}(\mathrm{sos}_{003}, \mathrm{axiom})$
$u(a, b) = u(b, a) \quad \mathrm{cnf}(\mathrm{sos}_{004}, \mathrm{axiom})$
$v(a, a, a, b) = v(a, a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{005}, \mathrm{axiom})$
$v(a, a, b, a) = v(a, b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{006}, \mathrm{axiom})$
$v(a, b, a, a) = v(b, a, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{007}, \mathrm{axiom})$
$u(a, b) = v(a, a, a, b) \quad \mathrm{cnf}(\mathrm{sos}_{008}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5) \text{ and } r(x_6, x_7, x_8)) \Rightarrow r(m(x_0, x_3, x_6), m(x_1, x_4, x_7), m(x_2, x_5, x_8)) \quad \mathrm{cnf}(\mathrm{sos}_{009}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5)) \Rightarrow r(u(x_0, x_3), u(x_1, x_4), u(x_2, x_5)) \quad \mathrm{cnf}(\mathrm{sos}_{010}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5) \text{ and } r(x_6, x_7, x_8) \text{ and } r(x_9, x_{10}, x_{11})) \Rightarrow r(v(x_0, x_3, x_6, x_9), v(x_1, x_4, x_7, x_{10}), v(x_2, x_5, x_8, x_{11}))$
$r(a, a, b) \quad \mathrm{cnf}(\mathrm{sos}_{012}, \mathrm{axiom})$
$r(a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{013}, \mathrm{axiom})$
$r(b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{014}, \mathrm{axiom})$
$\neg\, r(a, a, a) \quad \mathrm{cnf}(\mathrm{goals}, \mathrm{negated\_conjecture})$

ALG442-1.p Malcev, wnu3, wnu4 implies majority
$m(a, a, b) = b \quad \mathrm{cnf}(\mathrm{sos}, \mathrm{axiom})$
$m(a, b, b) = a \quad \mathrm{cnf}(\mathrm{sos}_{001}, \mathrm{axiom})$
$u(a, a, a) = a \quad \mathrm{cnf}(\mathrm{sos}_{002}, \mathrm{axiom})$
$v(a, a, a, a) = a \quad \mathrm{cnf}(\mathrm{sos}_{003}, \mathrm{axiom})$
$u(a, a, b) = u(a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{004}, \mathrm{axiom})$
$u(a, a, b) = u(b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{005}, \mathrm{axiom})$
$v(a, a, a, b) = v(a, a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{006}, \mathrm{axiom})$
$v(a, a, b, a) = v(a, b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{007}, \mathrm{axiom})$
$v(a, b, a, a) = v(b, a, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{008}, \mathrm{axiom})$
$u(a, a, b) = v(a, a, a, b) \quad \mathrm{cnf}(\mathrm{sos}_{009}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5) \text{ and } r(x_6, x_7, x_8)) \Rightarrow r(m(x_0, x_3, x_6), m(x_1, x_4, x_7), m(x_2, x_5, x_8)) \quad \mathrm{cnf}(\mathrm{sos}_{010}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5) \text{ and } r(x_6, x_7, x_8)) \Rightarrow r(u(x_0, x_3, x_6), u(x_1, x_4, x_7), u(x_2, x_5, x_8)) \quad \mathrm{cnf}(\mathrm{sos}_{011}, \mathrm{axiom})$
$(r(x_0, x_1, x_2) \text{ and } r(x_3, x_4, x_5) \text{ and } r(x_6, x_7, x_8) \text{ and } r(x_9, x_{10}, x_{11})) \Rightarrow r(v(x_0, x_3, x_6, x_9), v(x_1, x_4, x_7, x_{10}), v(x_2, x_5, x_8, x_{11}))$
$r(a, a, b) \quad \mathrm{cnf}(\mathrm{sos}_{013}, \mathrm{axiom})$
$r(a, b, a) \quad \mathrm{cnf}(\mathrm{sos}_{014}, \mathrm{axiom})$
$r(b, a, a) \quad \mathrm{cnf}(\mathrm{sos}_{015}, \mathrm{axiom})$
$\neg\, r(a, a, a) \quad \mathrm{cnf}(\mathrm{goals}, \mathrm{negated\_conjecture})$

ALG443+1.p Axioms for Median algebra
include('Axioms/ALG002+0.ax')

ALG444$\wedge$1.p Axioms for Untyped lambda sigma calculus
include('Axioms/ALG003ˆ0.ax')