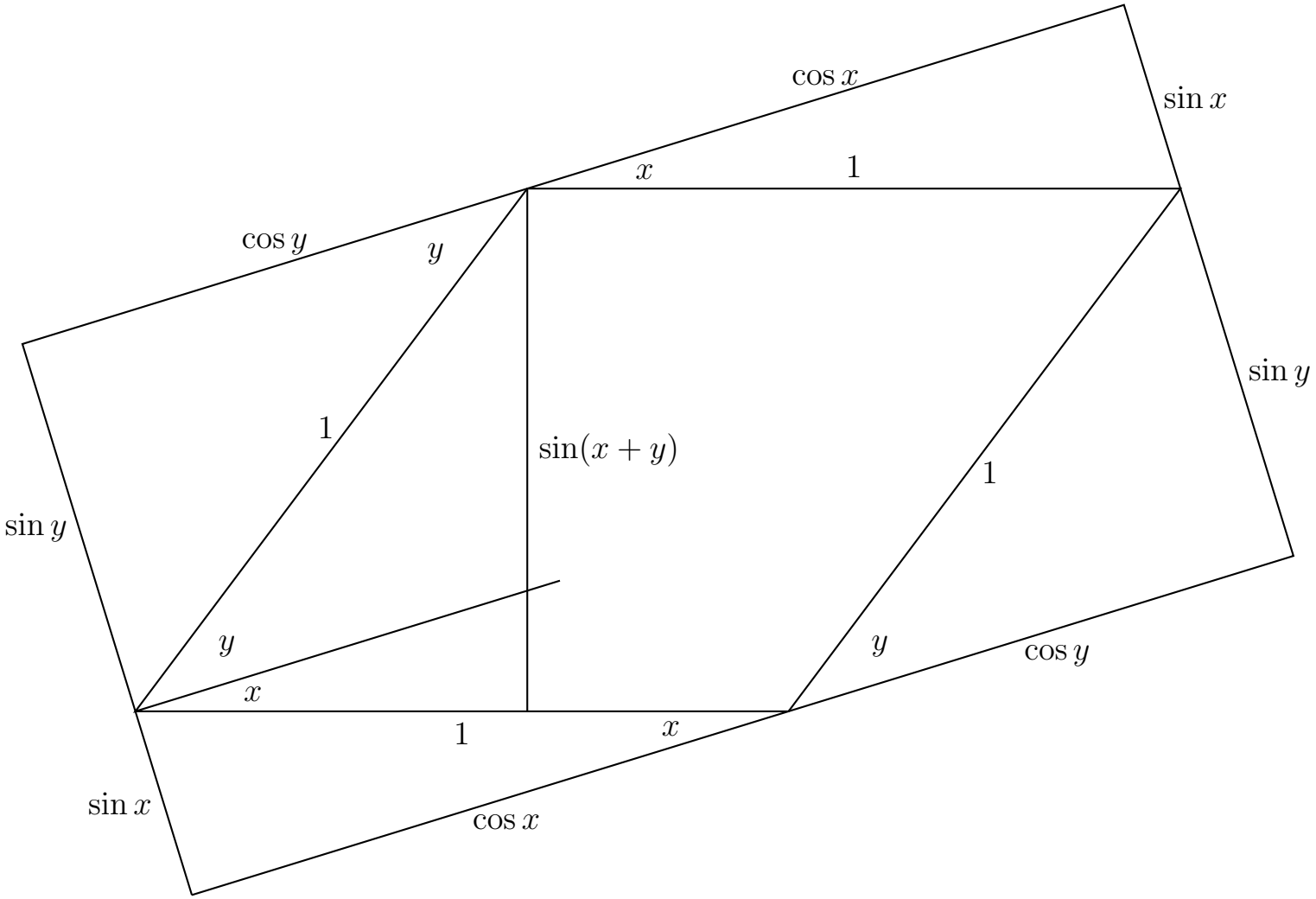
A Pythagorean-style proof of the sine sum-of-angles formula



Area of rhombus $= 1 \sin(x+y) = (\sin x + \sin y)(\cos x + \cos y)$ − area of 4 triangles

$= \sin x \cos x + \sin x \cos y + \sin y \cos x + \sin y \cos y - 2 \cdot \frac{1}{2} \sin x \cos x - 2 \cdot \frac{1}{2} \sin y \cos y$

Therefore $\sin(x+y) = \sin x \cos y + \cos x \sin y$

Peter Jipsen — Andrew Moshier — Math Poster 2011 — math.chapman.edu