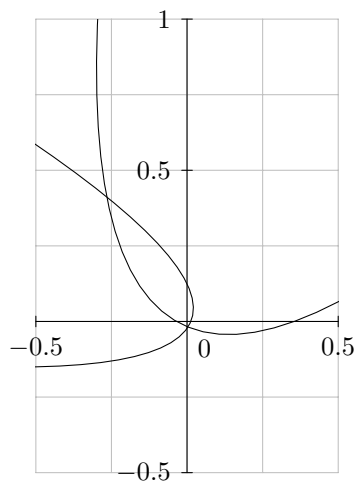# Change of Variable

1. Find the area between the ellipses $x^2 + 4y^2 = 4$ and $x^2 + 4y^2 = 16$. [Hint: the change of variables $u = x, v = 2y$ might be helpful.]

2. Calculate the area in the plane bounded by the rotated parabolas $y - 2x = (3y+x)^2$ and $(3y + x) = (y - 2x)^2$ shown below.

3. Let T be the solid bounded by the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$$

If the density is given by $\delta(x, y, z) = z^2$ find M, the mass of the solid.

4. Find the area between the rotated ellipses $5x^2 - 6xy + 5y^2 = 4$ and $5x^2 - 6xy + 5y^2 = 16$. [Hint: try the substitutions $x = u + v, y = u - v$.]