## Section 6.5

1. **Stretching a spring.** If a force on 90 N stretches a spring 1 m beyond its natural length, how much work does it take to stretch the spring 5 m beyond its natural length?

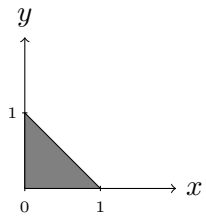
2. **Force of attraction.** When a particle of mass $m$ is at $(x, 0)$, it is attracted toward the origin with a force whose magnitude is $k/x^2$. If the particle starts from rest at $x = b$ and is acted on by no other forces, find the work done on it by time it reaches $x = a$, $0 < a < b$.

3. Problem 13 on page 399 of the text.

4. **Forcing electrons together.** Two electrons $r$ meters apart repel each other with a force of
$$F = \frac{23 \times 10^{-29}}{r^2} \text{ newtons.}$$
   (a) Suppose one electron is held fixed at the point $(1, 0)$ on the $x$-axis (units in meters). How much work does it take to move a second electron along the $x$-axis from the point $(-1, 0)$ to the origin?
   (b) Suppose an electron is held fixed at each of the points $(-1, 0)$ and $(1, 0)$. How much work does it take to move a third electron along the $x$-axis from $(5, 0)$ to $(3, 0)$?

## Mass Problems

1. Find the mass of the triangular region below. All lengths are in meters, and the density of the region is given by $\delta(x, y) = x$ grams/m$^2$.




2. Find the mass of the triangle in question 1 if the density is $\delta(x, y) = e^{(x+y)^2}$ grams/m$^2$. (Hint: divide the region into diagonal strips.)

3. A thin plate occupies the region of the plane bounded by the circle $x^2 + y^2 = 1$. Find the total mass if the density at the point $(x, y)$ is given by $\delta(x, y) = \frac{1}{\sqrt{x^2+y^2}}$. (Hint: divide the region into thin circular "rings" centered at the origin.)

4. The region bounded by the graph of $y = x^2$ and the $x$-axis, between 0 and 1, is revolved about the $x$-axis. The resulting solid has density $\delta(x) = x$. Find the total mass.