1. Compute the *lengths* of the following:
   (a) $y = \frac{1}{3}(x^2+2)^{3/2}$ from $x = 0$ to $x = 3$
   (b) $y = x^{3/2}$ from $(0,0)$ to $(4,8)$
   (c) $9x^2 = 4y^3$ from $(0,0)$ to $(2\sqrt{3},3)$
   (d) $y = \frac{1}{3}x^3 + \frac{1}{4x}$ from $x = 1$ to $x = 3$
   (e) $x = \frac{1}{4}y^4 + \frac{1}{8y^2}$ from $y = 1$ to $y = 2$
   (f) $y = \frac{e^x + e^{-x}}{2}$ from $x = -\ln 2$ to $x = \ln 2$
   (g) $x^{2/3} + y^{2/3} = 1$ (a famous example of an *astroid*)

2. Compute the *area* of the surface generated by revolving the given curve about the indicated axis:
   (a) $y = \frac{x}{2}$, $0 \le x \le 4$, about the x-axis
   (b) $y = \frac{x}{2}$, $0 \le x \le 4$, about the y-axis
   (c) $y = x^3$, $1 \le x \le 2$, about the x-axis
   (d) $y = \sqrt{2x - x^2}$, $0 \le x \le 2$, about the x-axis
   (e) $y = x^2$, $0 \le x \le \sqrt{2}$, about the y-axis
   (f) $y = \cos x$, $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$, about the x-axis
   (g) $y = \frac{2}{3}x^{3/2}$, $1 \le x \le 2$, about the y-axis
   (h) the astroid in 1(g), about the x-axis

3. Use the shell method to compute the *volume* of the solid generated by revolving the region bounded by the given curves about the indicated axis:
   (a) $y = 25 - x^2$, $y = 0$ about the y-axis
   (b) $y = x^2$, $y = 8 - x^2$ about the y-axis
   (c) $x = 9 - y^2$, $x = 0$ about the x-axis
   (d) $y = 2x^2$, $y^2 = 4x$ about the x-axis
   (e) $y = \sqrt{x}$, $y = 0$, $x = 4$ about the y-axis
   (f) $x = 2y - y^2$, $x = 0$ about the x-axis
   (g) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about the y-axis