HW 7: Section 5.3 and 5.4

Due: Thursday, September 26th in SQRC by 9pm

Learning Goals:

- Use the method of washers and shells to compute volumes of solids of revolution.
- Use integrals to compute arc length.
- Use integrals to compute surface area of solids of revolution.

Questions:

1. Sketch the region bounded by $y = 1 - x^2$, $y = 0$ and revolved around $y = 2$. Find the volume using shells.
2. Sketch the region bounded above by $y = x^2$, bounded below by $y = 0$, and bounded to the left and right by $x = -1$, $x = 1$ and revolved around $x = 2$.
   (a) Find the volume using shells.
   (b) Find the volume using washers.
3. Compute the arc length of $y = \sqrt{1 - x^2}$ from $x = -1$ to $x = 1$. (hint: look up the derivative of $\arcsin(x)$).
4. Sketch and compute the length of the *asteroid* defined by $x^{2/3} + y^{2/3} = 1$.
5. Set up an integral to compute the surface area of the surface of revolution given by the curve $x = \sin(y)$ on $0 \leq y \leq \pi$ revolved around the line $x = 2$. Use numerical methods (i.e. Riemann sums) to approximate the surface area.