1. Let R be the region bounded by $y = \ln(x)$ and the x-axis with $1 \leq x \leq e^2$. Find the volume when R is rotated about
   a. the y-axis using shells
   b. the y-axis using washers
   c. the x-axis using disks
   d. the x-axis using shells

2. Compute the arc length of each curve
   a. $y = \sqrt{1 - x^2}$, $-1 \leq x \leq 1$
   b. $y = 3x + 1$, $1 \leq x \leq 2$

3. Set up the integral that gives the area of the surface formed when the graph of $y = \arctan(x)$, $0 \leq x \leq 1$ is rotated about the x-axis.

4. Let $I = \int_1^\infty \frac{\pi}{x^3 + 2x + 7}\, dx$
   a. Show that I converges
   b. How closely does the definite integral $I_1 = \int_1^7 \frac{\pi}{x^3 + 2x + 7}\, dx$ approximate I?
   c. Find a definite integral that approximates I accurate with 0.005

5. Find the exact value of $\int_{1/2}^\infty \frac{\arctan(2x)}{1 + 4x^2}\, dx$