Math 142: Worksheet 4

1. Consider the region between the curves $y = x^2 - x - 3$ and $y = 2x^3 - 8x$.

   (a) Graph the region on your calculator, and observe that it consists of two parts. Sketch the graph below:

   (b) Use your calculator to find the intersection points of these curves.

   (c) Find the area of the region by evaluating two integrals.
2. Consider the region bounded by the curves $y = x$ and $y = \sqrt{x}$.

   (a) Sketch the region below.

   (b) Consider the solid obtained by rotating the above region about the $y$-axis. Determine the volume of the solid.

   (c) Consider the solid obtained by rotating the above region about the line $y = 5$. Determine the volume of the solid.
3. A CAT scan produces equally spaced cross-sectional views of a human organ that provide information about the organ otherwise obtained only by surgery. Suppose that a CAT scan of a human liver shows cross-sections spaced 1.5 cm apart. The liver is 15 cm long and the cross-sectional areas, in square centimeters, are 0, 18, 58, 79, 94, 106, 117, 128, 63, 39, and 0. Estimate the volume of the liver.

4. The base of a solid is a circular disk with radius 3. Parallel cross-sections perpendicular to the base are equilateral triangles. Determine the volume of the solid.