Homework Set 1

DUE: SEP 11-13, 2017 (AT THE BEGINNING OF RECITATION)

1. The base of a solid is the region between the x-axis, $y = \sqrt{x}$, and $x = 4$. Each cross section perpendicular to the x-axis is a semicircle with diameter running along the base. What is the volume of this solid?

2. Find the volume of the solid obtained by revolving the region bounded by the line $y = x$ and the parabola $y = x^2$ about the line $x = 3$.

3. Find the volume of the solid obtained by revolving the region bounded by $y = e^x$, $x = 0$, $y = 0$, and $x = \ln 3$ about the x-axis.

4. Find the volume of the solid obtained by revolving the region bounded by $x = y^2$ and $y = x - 2$ about the y-axis.

5. Find the volume of the solid obtained by revolving the region bounded by $y = \sqrt{x}$, $x = 1$, $y = 0$, and $x = 4$ about the y-axis.

6. (Thomas §6.1 Exercise 62, p. 375) The arch $y = \sin x$, $0 \leq x \leq \pi$ is revolved about the line $y = c$, $0 \leq c \leq 1$, to generate a solid S_c.

   a) What is the value of $0 \leq c \leq 1$ that *minimizes* the volume of the solid S_c?

   b) What is the value of $0 \leq c \leq 1$ that *maximizes* the volume of the solid S_c?

7. (Thomas §6.2 Exercise 43, p. 383) Derive the formula for the volume of a right circular cone of height h and radius r using an appropriate solid of revolution.