# Math 104-004, Homework 5

Due in recitation on Monday March 11 and Wednesday March 13

Please show work, print this sheet, and attach it to the solutions.

**Name:** _____

**Problems**

**1 Spring 2012-12** What is the area of the surface obtained by rotating the part of the curve $y = \sqrt{4 - x^2}$ from $x = 0$ to $x = 1$ about the $x$-axis?

**2 Fall 2010-2** Find the average value of the function $y = sin^3(x)cos^2(x)$ over the interval $[0, \pi]$.

**3 Fall 2009-13** A standard US Mailbox has a cross-section shaped like a square of side $S$ with a semicircle attached. Where is the centroid of this cross-section? State your answer in coordinates with the origin at the center of the square. *This question has a corresponding picture. You can find the question and the picture here:* `http://www.math.upenn.edu/ugrad/calc/m104/exams/104F09Final.pdf`

**4 Spring 2010-10** An artist is designing a wine glass in a flower shape, which can be generated by rotating the region bounded by $y = \sqrt{x}$ and $y = x$, between $x = 0$ and $x = 1$ about the $x$-axis. What is the surface area (which contains both the inside and the outside surfaces) of such a glass?

**5 Spring 2010-11** What is the x-coordinate of the centroid of the region bounded by the graph of $y = x^{\frac{1}{3}}$, $x = 8$ and the x-axis?

**6 Fall 2008-18** Find the area of the surface obtained by rotating the curve $y = \frac{1}{4}x^2 - \frac{1}{2}ln(x)$ from $x = 1$ to $x = 2$ about the y-axis.