Math 112 – Fall 2011
Examination 1

Please complete the following problems. All work must be shown in order to receive full credit. Answers without explanation will receive *no* credit. The use of books, notes, calculators, or any other external sources of information is not allowed during this examination.

1.(12 pts.) Find the length of the curve $y = \frac{1}{3}x^{\frac{3}{2}}$ for $0 \le x \le 12$.

2.(13 pts.) Find the area of the surface generated by revolving the curve $y = x^2$ for $\sqrt{2} \le x \le \sqrt{6}$ about the y-axis.

3.(13 pts.) Use cylindrical shells to find the volume of the solid obtained by revolving the region bounded by $y = \sin(\pi x^2), y = 0, x = 0$, and $x = 1$ about the y-axis.

4.(13 pts.) The base of a solid is the region bounded by $y = 1 - x^2$ and $y = x^2 - 1$. The cross-sections of the solid perpendicular to the x-axis are squares whose bases run between the given curves. Find the volume of this solid.

5.(24 pts.) Consider the region bounded by $y = e^x, y = 1$, and $x = 1$.

   a. Find the volume of the solid generated by revolving this region about $y = 1$.

   b. Find the volume of the solid generated by revolving this region about the x-axis.

6.(12 pts.) A 10 lb bucket containing 20 lbs of water is lifted from the ground at a constant speed to a height of 12 ft using a rope that weights 0.5 lb/ft. How much work is done?

7.(13 pts.) Consider the tank that is generated by revolving $y = x^4$ for $0 \le x \le 1$ ft about the y-axis. The tank is filled with a fluid weighing 25 lb/ft^3. How much work is done in pumping all of the fluid to a height of 2 ft above the top of the tank?