MATH 1550 - Calculus I - Section 1
Summer 2013

HOMEWORK 7

Due at the beginning of class, Monday, July 29th

Read the questions carefully. You must *show your work* to get full credit.

(1) Find the area enclosed by the curves $y = x^3 - 5x^2 + 6$ and $y = x^2 - 8x + 6$.

(2) Integrate the cross-sectional area of a sphere of radius R (treat this as a constant) to prove that the formula for its volume is $\frac{4}{3}\pi R^3$.

(3) Find the volume obtained by rotating the area under $y = 3\csc(2x)$ from $x = \frac{\pi}{6}$ to $x = \frac{\pi}{4}$ about the x-axis.

(4) Find the volume obtained by rotating the area enclosed by $x = \sqrt{y}$, $y = 5$, and the y-axis about the x-axis.

(5) Find the work required to build a rectangular pillar of height 12 ft whose base has length 2 ft and width 1 ft out of concrete whose density is 120 lbs/ft^3.

(6) Suppose a metal chain of length 16 m is hanging off the side of the building. If the chain's density is 4 kg/m, find the work required to lift the bottom of the chain to the top of the building (folding the chain in half). Note: Not all parts of the chain are being moved. Think about which parts are moving and how far they are moving.

(7) Find the work required to construct a square pyramid with a base of side length 5 ft and a height of 8 ft out of brick with density 80 lbs/ft^3. Note: We can think of slices of the pyramid as very thin boxes with square tops and bottoms, but the size of the slices varies (larger slices at the bottom, smaller slices at the top). Can we find a general formula for the volume of the slice at any height y?