General Instructions

1. **Write in complete mathematical sentences.** I want to know if you know why you are doing what you are doing and not just copying the "template" used in class. Note that writing in complete mathematical sentences does not mean that you write everything in words. Just write whatever you think will prove that you know what you are doing.

2. **You are only required to answer two items.** Let $wxyz - abcde$ be your student number. If $b$ is odd, I will check only #1 and #3. If $b$ is even, I will check only #2 and #3. I highly recommend you do ALL the exercises, though. No bonus will be given for answering items not assigned to you (except for the bonus knowledge you earn, which is more important).

3. **Each item must be alloted at least one page.** Do not start answering an item in the middle of a page. Go to the next page. Or better, go to the next spread. The bluebook has many pages. No need to cram everything in a few pages.

4. **Do not hesitate to consult if you need help.** This is 2% of your final grade and you have more control to do better here than on the exams. If you have already given enough effort on a problem and you are still confused, feel free to schedule a consultation with your instructor.

5. **Submit your homework on or before May 14, 2013 at 10:00am. Late homeworks will not be accepted.** Leave it on my shelf in MBAN 218. Be sure your homework is written on the bluebook I required you to have during the start of the semester.

1. Let
$$F(x) = \int_{2x}^{\frac{1}{69}} \sqrt{4 - 4\cos^2 t + 2\sin t}\, dt$$
. Find the arclength from $x = \frac{\pi}{8}$ to $x = \frac{\pi}{6}$ of $F(x)$.

2. Find the area enclosed by $f(x) = 2\sin^2(x)$ and $g(x) = 1 - \sin x$ on the interval $x \in \left[0, \frac{\pi}{2}\right]$.

3. Let $R$ be the region bounded by $x = y^2$ and $y = 8x^2$.

   a. Draw the region $R$ and label its two points of intersection.

   b. Setup the integral which represents the volume of the solid obtained by revolving $R$ about the line $x = -1$ using the method of **discs or washers**.

   c. Setup the integral which represents the volume of the solid obtained by revolving $R$ about the line $x = -1$ using the method of **cylindrical shells**.

   d. Solve for the volume of the solid obtained by revolving $R$ about the line $x = -1$ (using any of the two methods).

$\star$ Find the volume of the solid generated by rotating $y = x^2$ about the line $y = x$ on the interval $[0, 1]$.