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 a is odd, I will check only #1, #3 and $\star$. If a is even, I will check only #2, #3 and $\star$. 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 21, 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. Find $\dfrac{dy}{dx}$ of

$$y = \left[\sec\left(x^2 + 4\right)\right]^{\log_\pi(\sqrt{x}+4^x+\ln 4)}.$$

2. Do the following problems.

   a. Show that $\sin\left(x + \dfrac{\pi}{4}\right) = \dfrac{1}{\sqrt{2}}\sin x + \dfrac{1}{\sqrt{2}}\cos x$.

   b. Find the antiderivative $\displaystyle\int \frac{1}{\sin x + \cos x}$.

3. Let $f(x) = x^2 e^{1/x}$.

   a. Show using limits that f has no horizontal asymptotes.

   b. Evaluate **both** of the appropriate one-sided limits to determine whether f has a vertical asymptote at $x = 0$.

   c. Construct a table which shows on which intervals f is increasing, decreasing and concave up or down.

   d. Determine the relative extrema of f and identify if it is a relative minimum or a relative maximum. (You may use a calculator to figure out the y-value of the relative extremum point.)

   e. Graph f.

$\star$ Relate any of our Math 53 lessons to love using the following format

_____. *Parang pag-ibig.*

Examples:

- Sa unang tingin, mahirap alamin kung nag-eexist ang limit. Parang pag-ibig.
- Minsan, kapag nagsosolve ng antiderivatives, kailangang may maghiwalay para dumali ang buhay. Parang pag-ibig.
- Apply ka nang apply ng L'Hopital's, tapos marerealize mo sa dulo na hindi naman pala p'wede. Parang pag-ibig.