M305G – Precalculus
Summer II 2008
Problem Set 2 – Due Friday, July 18

"[The universe] cannot be read until we have learnt the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it is humanly impossible to comprehend a single word." – Galileo Galilei

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Something to keep in mind about the homework:

My grader and I **will not** have time to grade each problem in a detailed fashion. Our goal is to give you a sense of whether your answer to each problem was right or wrong (or partially right) . . . but that's it. If you get a problem wrong, please take a second look at it and try to figure out why you got it wrong; if you can't figure it out, **please see me** after class and we can discuss it. It's always possible that we made a mistake and that we owe you a point or two. At the very least, you'll get an explanation of what you did wrong.

Here's Problem Set 2. This problem set covers the material we discussed on Tuesday, and the material we will discuss on Wednesday. You have until Friday to finish the problems, but **don't put this off** – you'll find the problems to be easier if you work on them the same day we cover the relevant sections in class.

Section 1.3: 48, 52, 54, 58, 62, 68, 74, 80, 84, 96, 116, 118, 121.
On a lot of these problems, there's not that much to write. (There's not much you can say to "Find the slope of the graph of the equation $y = 6x + 3$"; the answer is obviously 6.) So in a lot of cases, there won't be much work to show. But if you need to do any algebra (*e.g.* changing an equation from general form to slope-intercept form) in the course of solving a problem, you should show it clearly.

Section 1.4: 10*, 16, 28, 30.
* On this problem, you need to assume that the segment from $(0, 1)$ to $(2, 3)$ is a diameter of the circle (that is, that the center of the circle is where it appears to be in the picture the book gives). See also bonus problem B2.

Section 2.1: 30, 31, 32, 36, 42, 49, 54, 68, 94.

Section 2.2: 12, 14, 16, 27.
Again, in this section, except for problem 27, there's not much work to show. Answers alone will suffice on problems 12 through 16.

Section 2.3: 24, 26, 28, 32*, 34, 36, 42, 60, 70.
* On this problem, assume there aren't any local minima or maxima other than the ones in the picture. (In "real life," it's quite possible that there are local minima and maxima other than the ones shown.)

Bonus Problems

B1. In problem 68 of section 1.3, you found the equation of the line that is perpendicular to the line $x - 2y = -5$ and runs through the point $(0, 4)$. Use this information to find the point on the line $x - 2y = -5$ that is closest to the point $(0, 4)$. What is the distance from the point $(0, 4)$ to the line $x - 2y = -5$?

B2. On problem 10 of section 1.4, you needed to assume that the segment from $(0, 1)$ to $(2, 3)$ is a diameter of the given circle. This is because there are many circles that have the points $(0, 1)$ and $(2, 3)$ on their circumference. Find the equation of another circle, besides the one you found in problem 10, that has the points $(0, 1)$ and $(2, 3)$ on its circumference. (*Hint:* First think about where the center of such a circle has to be.)

B3. Graph the equation $x^2y^2 = x^2 + y^2 - 1$. (*Hint:* Try using the techniques we covered in class Monday: plotting points, looking for intercepts, and using symmetries.)

B4. Graph the functions given in problems 39 and 44 of section 2.3. (Don't just run this through a graphing calculator and give me a picture; I want you to give me reasons why the graphs look the way they do.)