M305G – Precalculus

Summer II 2008

Problem Set 1 – Due Wednesday, July 16

"It is not enough to have a good mind. The main thing is to use it well." – René Descartes

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Some notes about the homework grading:

Since we have a very small class, it is my intention to try to grade every problem on the problem sets you turn in. My teaching assistant and I may not be able to grade everything closely, but we'll try to at least give you a sense of whether you were headed in the right direction on each problem, so that there aren't any surprises when a similar problem appears on a test.

In order to receive full credit on a problem, you must be clear about what you're doing mathematically, and **show your work**. This is especially (but not exclusively) true for odd-numbered problems, since the answers to these are given in the text; a bare answer without any justification on one of these problems won't get you any credit.

On this and future problem sets, each textbook problem is worth up to 2 points; each bonus problem is worth up to 5 points. Since there are 26 textbook problems on this set, a "perfect score" on this assignment is 52 points; however, any points you earn above and beyond these 52 will be kept as part of your homework total.

Your total homework grade for the course will be the sum of your scores on all the problem sets. These grades won't be weighted; a problem set with forty problems will be worth twice as much as a problem set with twenty problems.

Without any further ado, here's Problem Set 1:

Section 1.1: 20, 28, 32, 38, 44, 45, 50, 51, 54*, 57, 61, 65.
* On this one, just do the first part, where you show that the given triangle is equilateral.

Section 1.2: 22, 26, 28, 40*, 42*, 44*, 46*, 56+, 57+, 61+, 64+, 65+, 72, 73.
* Answers alone will suffice on these problems; there's not really any work to show.
+ In addition to checking intercepts and symmetries, please sketch the graph of each of these equations.

Bonus Problems

B1. Notice that in problem 51 of section 1.1, each median of the triangle is cut into two pieces by the intersection point of the three medians. What is the ratio of the lengths of these two pieces? (Compute this ratio for each median of the triangle. Note that before you can do this, you'll need to find the intersection point of the three medians.)

B2. Give a definition, similar to the definitions on page 13 of the text, of what it means for the graph of an equation to be symmetric about the line $x = a$, where a is a real number (not necessarily zero). The graph of the equation in problem 65 of section 1.2 is symmetric about the vertical line $x = a$ for some real number a; find this number. Justify your answer using the definition you came up with.

B3. Prove, using the definitions in section 1.2, that if a graph is symmetric about the y-axis and symmetric about the origin, then it must be symmetric about the x-axis as well. (Don't be intimidated by the word "Prove"; all I'm looking for is a convincing explanation, based on definitions and logic, of why this statement is true.)