M316K – Foundations of Arithmetic

Spring 2009

Problem Set 14 – Due Friday, May 8

"Think deeply of simple things." – Arnold Ross

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This is the last problem set of the semester. You won't be getting this one back before finals, but it will be graded, and I will post the solutions on my webpage.

The following instructions apply to all problems: In both sections, on most of the problems you're instructed to get a quick estimate and then find the exact answer. Don't worry about the estimates; I only need you to find the exact answer.

Section 6.1: 6, 10, 12, 23, 32, 37.

Section 6.2: (1), 6, 8, 12, 20, 27, 30.

You don't have to turn in answers to Problem 1, but make sure that you can do calculations like this quickly, accurately, and **by hand** (without a calculator).

Bonus Problems

B1. Suppose that Cody writes all of the positive integers from 1 to 2009. How many times does Cody write the digit 2 while doing this?

B2. Laura brings a big bag of M&M's to a study session with Team Euler. Since Laura has already eaten some of the M&M's, she divides the remaining M&M's among her three teammates by pouring a pile of M&M's onto each person's desk. Naturally, when Laura does this, the piles turn out to be different sizes. Alice notices that her pile is the biggest, so she gives half of her M&M's to Nathaniel. Nathaniel then notices that his pile is now the biggest, so he gives one-third of his M&M's to Deb. But then Deb notices that her pile is now the biggest, so she gives one-fourth of her M&M's back to Alice. Oddly enough, after these three transactions take place, Alice, Nathaniel, and Deb all have exactly the same number of M&M's. If Laura originally gave Alice 21 more M&M's than Nathaniel, how many M&M's did she originally give Deb?