Math 55—Fall 2012
Homework 4

Part I: Not to be handed in.

2.5: 27, 33

3.1: 23, 25, 39, 65

Part II: Problems to hand in. One or two problems will be selected for thorough grading and count 10 points each. Others count 2 points each.

2.5: 20, 34

3.1: 18, 44, 48, 64

Additional problem: you have N coins, one of which is counterfeit. All real coins have the same weight. The counterfeit coin is either heavier or lighter, but you don't know which in advance. You have a balance, with which you can compare two sets of coins A and B, to determine whether A is heavier, B is heavier, or they weigh the same. You also have an unlimited supply of known real coins.

The problem is to determine which coin is counterfeit, and whether it is heavy or light.

Show that if $N = 13$, it is possible to locate and determine the weight of the counterfeit coin in 3 weighings, and that if $N = 14$, at least 4 weighings are required.