Week 34 (5/5/03)

Counterfeit coin

(a) You are given twelve coins, eleven of which have the same weight, and one of which has a weight different from the others (either heavier or lighter, you do not know). You have a balance scale. What is the minimum number of weighings it takes to determine which coin has the different weight, and also whether it is heavier or lighter than the rest?

(b) You are given N coins, $N-1$ of which have the same weight, and one of which has a weight different from the others (either heavier or lighter, you do not know). You are allowed W weighings on a balance scale. What is the maximum value for N, as a function of W, for which you can determine which coin has the different weight, and also whether it is heavy or light?