

# CS111 - Recitation 1

## Exercise 1: Weighing Coins

a. Assume that you have 8 coins, and you know that 7 are 'okay' but one is 'bad'. You know that the bad coin has a different weight than the good coins, but you don't know whether it is heavier or lighter.

Construct an algorithm to find out which is the bad coin using just 3 weighings on a balance scale. (Hint: Find a way to determine that half of the coins are 'okay' with just 1 weighing.) Write your algorithm in the form of a flowchart.

b. Now do the same thing assuming that you have 9 coins, one of which is bad. (Still use just 3 weighings to find the bad coin.)

c. And now for a real challenge, do the same thing assuming that you have 13 coins.

## Exercise 2: Truth Tables

Create the truth table for the following expressions:

a.  $A \text{ OR } (\text{NOT } B)$

b.  $\text{NOT } (A \text{ AND } B)$

c.  $(\text{NOT } A) \text{ OR } (\text{NOT } B)$

d.  $(\text{NOT}(A \text{ AND } B)) \text{ OR } (C \text{ AND } B)$

Do you notice something about b and c?

## Exercise 3: Binary Conversion

What is the decimal value of each of the following binary representation?

a. 1111

b. 1101

c. 1111 1111

d. 1100 1010

e. 0000 1000

f. 0111 0011