CS111 Introduction to Computer Science 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 weightings 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. $(NOT(A\ AND\ B))\ OR\ (C\ AND\ B)$
  b. $A\ OR\ (NOT\ B)$
  c. $NOT\ (A\ AND\ B)$
  d. $(NOT\ A)\ OR\ (NOT\ B)$

Do you notice something about c and d?

Exercise 3: Binary Conversion

What is the value of each of the binary representation?

  a. 1111101
  b. 1100000
  c. 0001111
  d. 1100101
  e. 0000110
  f. 0110011