

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 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: Multiplication flowchart

As a group try and brainstorm ways to perform multiplication without access to an explicit multiplication operation. Together, create a flowchart showing all of these variables, decisions, and loops on the board.

Exercise 3: ‘Guess my number’ flowchart

The game: Each person picks a number in some range (say, between 1 and 100). The other person tries to guess this number. Whoever gets it right in the fewest guesses wins.

You will be grouped into pairs, and play this game for a few minutes. Try to come up with a winning strategy.

We will then meet as an entire group, pick the best algorithm, and write it out in the form of a flowchart.