Homework01

1. (Adapted from problem 1.5 in the textbook)

Say we had a "black box," which takes two numbers as input and outputs their sum. See Figure 1.7a in the Textbook. Say we had another box capable of multiplying two numbers together. See figure 1.7b. We can connect these boxes together to calculate p * (m + n). See Figure 1.7c. Assume we have an unlimited number of these boxes. Show how to connect them together to calculate:

a. ax+b

b. The average of the four input numbers w, x, y, and z

c. $a^2 + 2ab + b^2$ (can you do it with one add box and one multiply box?)

d. a^6 (can you do it using only 3 multiply boxes?)

e.ax^3+bx^2+cx+d(try to use boxs as few as you can)

2.(Adapted from problem 1.12 in the textbook)

3. (2.3)

a. Assume that there are about 400 students in your class. If every student is to be assigned a unique bit pattern, what is the minimum number of bits required to do this?

b. How many more students can be admitted to the class without requiring additional bits for each student's unique bit pattern?

4.(2.8)

5.(Adapted from 2.13)

Without changing their values, convert the following 2's complement binary numbers into 8-bit 2's complement numbers.

a.010110

b.1101

c.1111111000

d.01

6.(Adapted from 2.17)

Compute the following. Assume each operand is a 2's complement binary number.

a. 01 + 1011

b. 11 + 01010101

c. 0101 + 110

d. 01 + 10

7.

a.(2.21)

b.(2.22)

c.(2.25)

d.Decribe how to indicate overflow has occurred or not when 2’s complement numbers are added .

8.(2.34)

9.(2.50)

10.(2.55)