COMP.2030 LAB 7 10/18/23

NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. When x and y are **8 bits** long, and have values 0x00 and 0x7F, respectively, show result of the following expressions represented in ***hexadecimal***:

~x & y !x & y ~x && y

0x7F 0x01 0x01

1. It turns out there is one number that is written in base-7 as “AB” and in base-9 as “BA”, for some choice of “A” and “B” between 1 and 6, respectively. What is this number (in decimal) and what are A and B (remember, neither is 0)?

31 (in decimal)

A = 4

B = 3

1. The Greek mathematician Archimedes proved that the lower bound of π is 223/71. Encode the 223/71 into the IEEE floating-point format with 4-bit exponent and 8-bit fraction.

Exponent: 1000 Fraction: 1001 0010

1. (15 pt) Consider an IEEE floating point format with 4-bit exponent and 8-bit fraction (no sign bit). Show the values of the following IEEE floating point representations in **binary** scientific notations (1.1x2-3, for example) (the first four bits are exponent bits).

1110 11110000 – 1.1111x27

1000 00001111 – 1.00001111x21

0000 11110000 – 0.1111x2-6