Assignment 2

CMPT 215
Due: July 27^{th}, 2017
Total: 65 marks

Problem 1.
(8 marks) Add the following, indicate if there is a type of overflow or carry over for a 8 bit binary.

i $12 + 10$

ii $01001100 + 00111110$

iii $10010000 + 11111111$

iv $4 + -13$

Problem 2.
(8 marks) Subtract the following, indicate if there is a type of overflow or carry over for a 8 bit binary.

i $00111010 - 00011111$

ii $9 - 10$

iii $00001010 - 11111111$

iv $4 - 13$

Problem 3.
(12 marks) Multiply the following, indicate if there is a type of overflow or carry over for a 8 bit binary.

i 00111010×00011111

ii 9×10

iii 01100111×00001111

iv 11010100×11110101

Problem 4.
(6 marks) Divide the following, indicate if there is a type of overflow or carry over for a 8 bit binary.

i 01001100/00000100

ii 10101111/00001111

iii 11010100/11110101

Problem 5.
(8 marks) Convert the following to IEEE 754 single precision binary floating point representation for each of the following numbers.

i -3.96875

ii -1.5

iii 1.1×10^{-126}

iv 2.8×10^{6}

Problem 6.
(8 marks) Convert the following IEEE 754 single precision binary floating point values to $base_{10}$ number.

i 0100 0000 0100 0000 0000 0000 0000 0000

ii 0100 0001 1010 0000 0000 0000 0000 0000

iii 1111 1111 1000 0000 0000 0000 0000 0000

iv 1100 0001 0101 1010 0000 0000 0000 0000

Problem 7.
(10 marks) Fill out the following table for the following MIPS instructions, assume that it starting at address 4000.

```
loop:   ben   $s0,$s1,out
        sw    $s2,4($s1)
        addu  $s1,$s1,$t0
        j loop
out:    ori  $t2,$s7,3
```

Instruction	Format	Fields					
		6 bits	5 bits	5 bits	5 bits	5 bits	6 bits
loop: bne $$s0,$s1,out							
sw $$s2,4($s1),out							
addu $$s1,$s1,$t0							
j loop							
out: ori $$t2,$s7,3							

Problem 8.
(5 marks) Design and show the truth table for Ex-Nor Gate using only NOT, AND and OR gates. EX-Nor game is a digital logic gate that is the reverse or complementary form of the Exclusive-OR function.

Bonus:

Problem 9.
(3 marks) Name two universal Quantum circuits and one error correction gate used in Quantum computers.