CS 305

Quiz1 Tutorial

1. Convert the following numbers in binary format to decimal form:

From 1's complement
   a) 0011 1101
   b) 1000 1000

From 2's complement
   a) 1011 1001
   b) 1111 1001

From sign magnitude
   a) 0000 0000 0000 0000 0000 0000 0011 1010
   b) 1111 1111 1111 1111 1111 1111 1101 1101

2. Convert the following decimal numbers to the form indicated next to them:
   a) 33 - to 2s complement form in 8 bits
   b) -11 - to sign magnitude form in 8 bits
   c) -20 - to 2s complement form in 8 bits
   d) -1 - to 1s complement form in 8 bits.

3. What is the range of integers which can be stored in a 32-bit register? In the first lab, it was observed that **li** is actually a pseudo instruction. It translates to either 'x' and **ori**, or just **ori** depending upon the integer to be initialized with. What is 'x'? What is the range of numbers for which it only translates into **ori** and range of numbers for which it translates to **ori** and 'x'?

4. Let $s0 be 1111 1111 1111 1111 1111 0000 0000 0111
   and $t0 be 0000 1000 0000 0000 0000 0000 1111 1000
   (both in sign-magnitude form)

   What are the values of $t1 and $t2 after these instructions?
   slt $t1 $s0 $t0
   sltu $t2 $t0 $0

5.
   a) What is overflow?
   b) Give an example where overflow occurs.
   c) In which case in addition instruction, can overflow never occur?
   d) In addition, how can it be detected? Hint: consider the most significant bit.
   e) In processor control, when an overflow is detected, exception is generated. However there are instructions wherein despite overflow, exceptions are not

caused. Name any two of such instructions.

6. What is the value of $t0 after the following instruction is executed?

```
addu $t0 $0 0xfffffff0
```

7. Write the following instructions in terms of **beq** and **bne**:

```
slt $s1 $s0 $t0
sltui $s1 $s0 0x12
```

8. Instruction **lb** or 'load byte', similar to **lw**(load word), but to load a single byte from memory. There is also an instruction **lbu** or 'load byte unsigned'.
Which among them does sign extension? How?

9.

a) In single precision floating point representation, how many bits are used to represent the exponent and fraction part?
b) Convert the following decimal numbers in binary, in single precision:

i. 10.01
ii. -2.12
iii. -0.60

10. Convert the following floating point numbers in binary representation to decimal:

a. 0000 0001 0100 0000 0000 0000 0000 0000
b. 1000 1111 0101 1100 0000 0000 0000 0000