

## EECS 270

### Homework #5

1. Perform the following number conversions. Show at least 10 bits of accuracy beyond the binary point and mark any repeating bits. **(3)**

- a)  $1692_{10} = ?_2$
- b)  $541.33_{10} = ?_2$
- c)  $311.2_{10} = ?_2$

2. Perform the following operations using binary or base 16 addition or subtraction. Show all carries or borrows. Perform the subtraction operation as a subtractor circuit would do so on unsigned numbers (i.e. do not complement and add 1 to the subtrahend as we would with two's complement numbers). **(3)**

- a)  $1011101_2 + 111001_2 = ?_2$
- b)  $DEAD_{16} + BEEF_{16} = ?_{16}$
- c)  $1101100_2 - 0100111_2 = ?_2$

3. a) Represent the following base 10 numbers in signed magnitude, one's complement, and two's complement, using 6-bit strings: **(1.5)**

-18 , -1 , -31

- b) For each of the following binary strings, state the decimal number that is represented by the strings when they are interpreted as unsigned, signed magnitude, one's complement, and two's complement binary numbers: **(1.5)**

101010  
111111

4. Add the following numbers using 6-bit two's complement addition. State whether or not overflow occurs in each case. **(3)**

- a)  $(-20) + (13)$
- b)  $(-18) + (-25)$
- c)  $(-15) + (-1)$

5. Subtract the following numbers using 6-bit two's complement arithmetic using the same process that a computer would use. State whether or not overflow occurs in each case. **(3)**

- a)  $(25) - (7)$
- b)  $(-9) - (-10)$
- c)  $(-15) - (18)$