

CS2810 Homework 5 - 116 points - Due by midnight October 14. Submit this homework through Eagle.

For this homework assignment you may work individually or in a group of up to 3 students. If working in a group, be sure that when you turn in your homework through Eagle you include the names of everyone in the group.

Questions

1. (24 points, 2 points each cell) For the following table, fill in the blank cells with the appropriate value. For example, in row 1, the value in the base 10 column is the value of the decimal number which has a base 2 value of 101101, and similarly for the other two cells in that row, etc.

Base 2	Base 10	Base 3	Base 16
101101			
	78		
		221	
			ABC

2.) (12 points, 4 points each part) As noted in class, when dealing with fractional parts, the conversion between bases may not be exact. For the following conversions, using truncation, give only enough digits so that the error of conversion is $\leq 0.1_{10}$ in all cases.

a.) $0.62_{10} = ?_2$

b.) $0.111_2 = ?_{10}$

c.) $0.21_3 = ?_2$

3.) (24 points, 2 points each cell) For the following table, fill in the blank cells with the appropriate value. In each cell the number is in binary and it is a 6 bit value in all cells.

Base 2- Sign Magnitude	Base 2- 2's complement	Base 2- 1's complement
101101		
011010		
	101101	
	011010	
		101101
		011010

4.) (16 points, 4 points each part) In HEX, give the value for the following code words:

- a.) 'A' = ?ASCII
- b.) '7'=?ASCII
- c.) '&'=? Unicode
- d.) "ab"=?C++ string

5.) (25 points, 5 points each part) In HEX or decimal are noted, give the value for the following:

- a.) 83.5_{10} =?HEX for IEEE754 format single precision

- b.) $1.101_2 \times 2^3 = ?$ HEX for IEEE754 format single precision
- c.) $0F0FCDE0_{\text{HEX-754-32bit}} = ?$ decimal
- d.) $-\infty = ?$ HEX for IEEE754 format single precision
- e.) $0.101_2 \times 2^{-130} = ?$ HEX for IEEE754 format single precision

6.) (5 points) What is the Hamming distance between FFF_{16} and 888_{16} ?

7.) (10 points) What is the Hamming code for the following character set?

Character	Frequency	%
a	10	10
b	15	15
c	12	12
d	7	7
e	23	23
f	25	25
g	8	8