OC - Fall 2018 (IIIT Sri City)

Practice Assignment 1

1. **Binary to Decimal Conversion**

In order to convert a binary number to decimal we repeatedly add the product of digit value and the positional value.

Example: 11101 (binary)

Start at the right hand digit

1 * 1 = 1
0 * 2 = 0
1 * 4 = 4
1 * 8 = 8
1 * 16 = 16

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29 (decimal)

Convert from Binary to Decimal

$(1001101)_2$ = (_____) $_{10}$

2. **Decimal to Binary Conversion**

In order to convert a decimal number to binary, we may repeatedly subtract the largest possible binary positional value from the number and place a 1 if a subtraction is possible and 0 if not.

Example: 329 (decimal)

329-1024 no,	0
329-512 no,	0
329-256=73,	1
73-128 no,	0
73-64=9,	1
9-32 no,	0
9-16 no,	0
9-8=1,	1
1-4 no,	0
1-2 no,	0
1-1=0	1

Positional Values

1024	512	256	128	64	32	16	8	4	2	1
0	0	1	0	1	0	0	1	0	0	1

Therefore: 329 (decimal) = 101001001 (binary)

Convert from Decimal to Binary

$(1539)_{10}$ = (_____)$_2$

3. Convert the following binary numbers to decimal:

a) 11111_2
b) 101101_2
c) 1100011_2
d) 101_2
e) 0.11_2
f) 101.11_2
g) 1010_2
h) 10100_2
i) 101000_2

4. Looking at your working in 3g-h, in general, if B is some binary number (such as 1010_2), what number do you get when you attach a zero at the right end (such as 10100_2). What number do you get when you attach 2 zeros at the right end? In general, what number do you get when you attach n zeros at the right end?

5. **Counting in different number systems**. Complete a table of the decimal values from 0 through 18 written in the following bases: Binary, Octal, and Hex.

Binary	**Octal**	**Decimal**	**Hex**
0000	0	0	0
0001	1	1	1
0010	2	2	2
		3	
		4	
		5	
		6	
		7	
		8	
		9	
		10	
		11	
		12	
		13	
		14	
		15	
		16	
		17	
		18	

6. **Complete the following table**.

For octal - binary conversions, each octal digit is represented by 3 binary digits. For hexadecimal - binary conversions, each hexadecimal digit is represented by 4 binary digits.

BINARY	OCTAL	DECIMAL	HEX
100110110101			
	3734		
			2B4

7. **Write the code for the following ASCII characters**. Show binary, hex and decimal values.

Hex C _____ c _____

Binary C _____ c _____

Decimal C _____ c _____

Hex Y _____ y _____

Binary Y _____ y _____

Decimal Y _____ y _____

8. **Fill in the following binary values table.** This exercise is designed to help students understand the effect of the size of a number on both the magnitude of a number and the number of values which can be represented.

Unit	Number of Bits n	Largest Number 2^n-1	Number of values 2^n
Bit	1		
2 Bit	2		
Nibble	4		
Byte	8		
1K	10		
2 bytes	16		
3 bytes	24		
Full word * (Signed Long)	32		

* Just give the largest positive number and the number of positive values.

9. Write a table of all the possible values of a 4bit signed binary number. Start off with +7 at the top and continue down to -8.

Hint: To make sure that you are on track, calculate the complement of a positive number to verify that you have correctly calculated the value of the equivalent negative number.

Value	**Signed binary**	**Value**	**Signed binary**
+7	0111	-1	_____
+6	_____	-2	_____
+5	_____	-3	_____
+4	_____	-4	_____
+3	_____	-5	_____
+2	_____	-6	_____
+1	_____	-7	_____
+0	_____	-8	_____

10. Represent 0.78125, 1.25, and 78.725 in binary.