Answer All Questions

1) Find the most significant digit and the least significant digit of the following numbers.

Number	MSD	LSB
329_{10}	3	9
1237.0_{10}	1	7
58.32_{10}	5	8
0.0975_{10}	9	5
0.4_{10}	4	4
56870_{10}	5	7
154.01_{10}	1	1
23.080_8	2	8
$AD239_{16}$	10	9
0.00110_2	4	2
1000_2	8	8
011101_2	16	1
0.11001_2	0.5	2**(-5)
1.0010_2	1	0.125
0.00110_2	0.125	0.0625
1001_2	16	1
011.101_2	2	0.125

2) Convert the following decimal numbers to binary numbers.
   a) 12_{10} 1100
   b) 46_{10} 101110
   c) 155_{10} 10011011
   d) 472_{10} 111011000
   e) 1163_{10} 10010001011

3) Convert the following decimal numbers to octal numbers.
   a) 158_{10} 236
   b) 155_{10} 233
   c) 472_{10} 730
   d) 1163_{10} 2213

4) Convert the following decimal numbers to hexadecimal numbers.
a) 38_{10} 26
b) 47_{10} 2f
c) 256_{10} 100
d) 478_{10} 1de
e) 1963_{10} 7ab

5) Convert the following binary numbers to decimal numbers.
a) 101_2 5
b) 111010110_2 470
c) 1010010111_2 663
d) 1101_2 13

6) Convert the following octal numbers to decimal numbers.
a) 230_8 152
b) 745_8 485
c) 2065_8 1077
d) 1275_8 701

7) Convert the following hexadecimal numbers to decimal numbers
a) $1A_{16}$ 161
b) $7EF_{16}$ 2031
c) $A49_{16}$ 2633
d) $AB2_{16}$ 2738

8) Convert the following binary numbers to octal numbers.
a) 10011001_2 231
b) 111100111_2 747
c) 10101010110_2 2526
d) 1011101_2 135

9) Convert the following binary numbers to hexadecimal numbers.
a) 11011010_2 da
b) 11111001101_2 7cd
c) 10011100011_2 4e3
d) 10110_2 16
e) 10111011100_2 5dc

10) Convert the following octal numbers to binary numbers.

a) 457_8 100101111

b) 10_8 1000

c) 245_8 10100101

d) 706_8 111000110

11) Convert the following octal numbers to hexadecimal numbers.

a) 1057_8 22f

b) 320_8 d0

c) 475_8 13d

d) 1673_8 3bb

12) Convert the following hexadecimal numbers to binary numbers.

a) 78_{16} 1111000

b) $B2C_{16}$ 101100101100

c) $4DEF_{16}$ 100110111101111

d) 74_{16} 1110100

e) $2AE_{16}$ 1010101110

13) Convert the following hexadecimal numbers to octal numbers.

a) 320_{16} 1440

b) $A7B_{16}$ 5173

c) $10ED_{16}$ 10355

d) $23A_{16}$ 1072

14) Fill in the blanks in the table given below.

Name of the Colour	Colour	Hexadecimal Value	R	G	B
Dark purple		# 871F78	135	31	120
Light pink		#ffb6c1	255	182	193
Sky blue		#3299cc	50	153	204
Green		#00ff00	0	255	0
Yellow		#ffee00	255	238	0

15) Write down the answers for following questions
   a) $C1A_{16} + 4A2_{16} =$ 4284
   b) $144_8 + 175_8 =$ 225
   c) $124_8 + 165_8 =$ 201
   d) $4A6_{16} + 99_{10} =$ 1289
   e) $48B_{16} + 00101011_2$ 1206
   f) $101_{16} + 110_8 =$ 263
   g) $5D_{16} + 10111_2 =$ 116
   h) $11001100 - 01010101 =$ 119

16) What is the binary representation of 9.25_{10}?   1001.001
17) What is the decimal equivalent to the binary 110101.11_2?   53,75
18) What is the binary equivalent to decimal 54.25?   110110.001

19) Answer the following questions.
   a) Show how the computation 15+ (-5) is done in 8-bit two's complement arithmetic.
   b) Explain how you deal with the carry generated in the most significant bit.
   c) Explain how the positive and negative numbers in two's complement can be converted into decimal numbers.

   a)
   15 -5 -> 15 + (-5)

   15 -> 00001111
   5 -> 00000101

   2's compliment to get the value of -5
   1. 5 -> 1's compliment -> 11111010
   2. Add 1 to LSB -> 11111010 + 00000001 = 11111011

   15 + (-5) -> 00001111 + 11111011 = 100001010
   MSB 1 is an overflow bit so it's discarded.

   The answer is 00001010 which is (+5)

   b) Sine this is 2's compliment, we can just discard the overflow bit.

   c) When converting + numbers, get the decimal value of it

   If it's a - number, we need to flip to get the binary number and then add1 to the number, then as usual we have to convert it to decimal