

Practice Sheet 1
CSE 112 Computer Organization

Q1: Fill the following table by writing the numbers in the mention notation. Write “-” if an appropriate notation does not exist

<u>Decimal</u>	<u>Unsigned Binary</u>	<u>Signed Magnitude</u>	<u>2's complement</u>
15			
-100			
			011001
		11111	
	10011		
67			
			10010
			01000101
		0101001	
			10000000

Q2: Calculate the below expression using 1's complement and verify converting back to decimal. The numbers should be taken in 4-bit representation.

$-5 + (-1)$

Q3. Fill in the following by writing the numbers in the mentioned notation. (xxx) means xxx is repeating indefinitely

Try to write sign exponent and mantissa separately before writing the whole IEEE754 notation. In signed notation for fixed point numbers, we just add a negative sign in front of the binary to denote the sign.

<u>Decimal</u>	<u>Signed Fixed Point</u>	<u>IEEE754 single precision</u>
10.5		
	-1.0(1001)	

		01000001100111100000000000000000
	10010.(1001)	
		101111111101000000000000000000
-8.4		

Q4: Perform the following computation in 2's complement notation and verify your solution by converting the result back decimal.

- a. $-200 + (-200)$
- b. $156 - 100$
- c. $81 - 80$
- d. $99 + 32$
- e. $4 - 13$

Q5: Multiply the following unsigned numbers in binary and verify the result by converting the product back to decimal.

- a. 16×4
- b. 13×16
- c. 5×3
- d. 8×6
- e. 3×32

ANSWERS

A1:

<u>Decimal</u>	<u>Unsigned Binary</u>	<u>Signed Magnitude</u>	<u>2's complement</u>
15	1111	01111	01111
-100	-	11100100	10011100
25	11001	011001	011001
-15	-	11111	1110001
19	10011	010011	010011

67	1000011	01000011	01000011
-14	-	11110	10010
69	1000101	01000101	01000101
41	101001	0101001	0101001
-256	-	11_0000_0000	100000000

A2.

+5 in binary = 0101

-5 (1's) = 1010

+1 = 0001

After addition: 1011

Hence, its a negative number since MSB is 1, and the number is 1's complement of 011 = 100 = 4

Decimal = -4, which is correct.

A3:

<u>Decimal</u>	<u>Signed Fixed Point</u>	<u>IEEE single754 precision</u>
10.5	1010.1	01000001001010000000000000000000
-1.3	-1.0(1001)	10111111101001100110011001100110
19.75	10011.11	01000001100111100000000000000000
18.6	10010.(1001)	01000001100101001100110011001101
-1.8125	-1.1101	10111111111010000000000000000000
-8.4	-1000.(0110)	11000001000001100110011001100110

A4: Verify by converting back to decimal.

A5: Verify by converting back to decimal.