Module 2 Assignment: Number Systems for Computation

EN.605.204 Computer Organization

Question #1: Binary Numbers

Please convert the following number to/from binary to decimal and complete the missing values in the chart below. Be sure to show your work (you may take pictures/scan your written work or provide typed responses).

Binary	Signedness	Decimal
1101	Unsigned	13
00110	One's Complement	-25
011010110	Two's Complement	-298
0111011001110	One's Complement	−4401
110000110010	Two's Complement	−974

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Question #2: Hexadecimal Numbers

Please convert the following number to/from hexadecimal to decimal/binary and complete the missing values in the chart below. Be sure to show your work (you may take pictures/scan your written work or provide typed responses).

Hex	Signedness	Decimal	Binary
B2C	Unsigned	2860	101100101100
E6	One's Complement	-25	11100110
2C	Two's Complement	-84	0101100
3AFD	One's Complement	−50434	0011101011111101
BEE	Two's Complement	-1040	101111101110

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Question #3: Octal Numbers

Please convert the following number to/from octal to decimal/binary/hex and complete the missing values in the chart below. Be sure to show your work (you may take pictures/scan your written work or provide typed responses).

Octal	Signedness	Decimal	Binary	Hex
1051	Unsigned	553	001000101001	229
-167	One's Complement	−119	0001000	8
246	Two's Complement	166	10100110	A6
176544	One's Complement	−667	1111110101100100	FD64
35	Two's Complement	-99	0011101	1D

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Question #4: Arithmetic Overflow

Complete the following arithmetic operations and tell whether or not there is overflow and provide a brief justification. Please be sure to show your work (you may take pictures/scan your written work or provide typed responses).

Unsigned, 5-bit binary addition			5-bit Binary Sum	5-bit Decimal Sum	Overflow?
01010	+	01011	10101	21	NO

Unsigned, 8-bit binary addition			8-bit Binary Sum	8-bit Decimal Sum	Overflow?
11011001	+	10100110	101111111	383	YES

Two's Complement, 16-bit hex addition			16-bit Binary Sum	16-bit Decimal Sum	Overflow?
FACE	+	6EEF	10110100110111101	-38467	YES

Two's Complement, 8-bit hex subtraction			8-bit Binary Sum	8-bit Decimal Sum	Overflow?
0x88	-	0x0A	01110010	-114	NO

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Question #5: IEEE 754 Floating-point Number

Please convert the following number to its binary and hexadecimal IEEE 754 formatted equivalent.

-8765.125

Binary: 10001000111101.001(for 8765.125)
Two's Complement: 01110111000011.110(-8765.125)
IEEE 754: s=1, exponent=10001100, Mantissa=00010001111010010000000
Binary IEEE 754=11000110000010001111010010000000
Hexadecimal IEEE754=0xc608f480

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Question #6: Converting Bytes to Binary and ASCII Text

Please convert the following sequence of bytes to:

1. Binary
2. ASCII characters

0x43
Binary: 01000011
ASCII:C

0x6F
Binary: 01101111
ASCII: o

0x6D
Binary: 01101101
ASCII: m

0x70
Binary: 01110000
ASCII: p

0x75
Binary: 01110101
ASCII: u

0x74
Binary: 01110100
ASCII: t

0x65
Binary: 01100101
ASCII: e

0x72
Binary: 01110010
ASCII: r

0x20
Binary: 00100000
ASCII: Space

0x4F
Binary: 01001111
ASCII:O

0x72
Binary: 01110010
ASCII: r

0x67
Binary: 01100111
ASCII: g

0x21
Binary: 00100001
ASCII: !

Binary sequence: 01000011 01101111 01101101 01110000 01110101 01110100 01100101 01110010 00100000 01001111 01110010 01100111 00100001

ASCII sequence: 'C' 'o' 'm' 'p' 'u' 't' 'e' 'r' ' ' 'O' 'r' 'g' '!'

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Deliverables

Please submit your assignment showing all work in a PDF named <Your JHEDID>_module2.pdf using the Assignment link on Canvas.