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CS 261 Machine Organization Homework 1

This homework must be completed individually and is due via Gradescope. For all problems, you need to fill the tables in the fillable PDF form and submit the entire form to the HW1 submission on Gradescope.

You can include your extra work after Problem C. We have set up the submission to expect 6 pages after the table. If you do not want to show your work, it is okay to leave these pages blank.

Problem A (20 points)

1. Encode your UIC e-mail address (NetID@uic.edu) into ASCII and fill the following table with the decimal and hexadecimal ASCII equivalents of each character. Enter your NetID within the rows given in this page (extra rows may be left unfilled). Enter the rest of your e-mail address in the next page. (10 points).

Character	Decimal ASCII equivalent	Hexadecimal ASCII equivalent
j	106	6A
d	100	64
i	105	69
a	97	61
z	122	7A
8	56	38
8	56	38
@	64	40
u	117	75
i	105	69

c	99	63
.	46	2E
e	101	65
d	100	64
u	117	75

2. Convert the decimal encoding for your UIC NetID (from subproblem 1) into BCD (Binary Coded Decimal) and fill in the following table (10 points).

Character	Decimal ASCII equivalent	BCD equivalent
j	106	1101010
d	100	1100100
i	105	1101001
a	97	1100001
z	122	1110000
8	56	0111000
8	56	0111000
@	64	1000000
u	117	1110101
i	105	1101001

Problem B (40 points, 2 points for each missing value)

Fill in the missing values in the following table. The values should be 16 bits in length and should be expressed in two's complement form.

Decimal	Binary	Hexadecimal
123	0b0000000001111011	0x007B
-85	0b1111111110101011	0xFFAB
68	0b0000000001000100	0x44
31802	0b111110000111010	0x7C3A
63358	0b1111011101111110	0xF77E
5936	0b1011100110000	0x1730
18452	0b0100100000010100	0x4814
65232	0b1111111011010000	0xFED0
56423	0b1101110001100111	0xDC67
-16397	0b1011111111110011	0x-400D
249	0b0000000011111001	0xF9
7038	0b0001101101111110	0x1B7E

Problem C (40 points, 2 points for each missing value)

Fill in the missing values in the following table. The values should have 8 bits before the binary decimal point and 8 bits after the binary decimal point, and should be expressed in two's complement form.

Decimal	Binary	Hexadecimal
6 1/4	0b00000110.01000000	0x06.40
-13 3/8	0b11110010.10100000	0xF2.A0
44 11/32	0b101101.01011	0x2D.58
-121 43/64	0b 1111001.101011	0x 0x79.AC
177 123/128	0b10110001.11110110	0x B1.F6
164 117/256	0b 10100100.01110101	0xA4.75
-35 29/32	0b 100100011.11101	0x 23.E8
97 51/128	0b 1100001.0110011	0x61.66
227 67/256	0b 11100011.01000011	0xE3.43
117 9/16	0b 1110101.1001	0x75.90
84 23/64	0b 1010100.010111	0x54.5C
149 13/32	0b10010101.01101000	0x95.68

