Chapter 1 Exercise Questions

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1. Convert the following decimal numbers to unsigned binary numbers. Make sure and show your work per Example 1.2 from the textbook. You can start on either right or left. If you do not show your work, you will receive 0 pts. Each correct answer is work 2 pts.

a. 63

63/2 = 31, remainder is 1
31/2 = 15, remainder is 1
15/2 = 7, remainder is 1
7/2 = 3, remainder is 1
3/2 = 1, remainder is 1
1/2 = 0, remainder is 1

$(63)_{10}$ is 111111.

b. 229

229/2 = 114, remainder is 1
114/2 = 57, remainder is 0
57/2 = 28, remainder is 1
28/2 = 14, remainder is 0
14/2 = 7, remainder is 0
7/2 = 3, remainder is 1
3/2 = 1, remainder is 1
1/2 = 0, remainder is 1

$(229)_{10}$ is 11100101

c. 845

845/2 = 422, remainder is 1
422/2 = 211, remainder is 0
211/2 = 105, remainder is 1
105/2 = 52, remainder is 1
52/2 = 26, remainder is 0
26/2 = 13, remainder is 0
13/2 = 6, remainder is 1
6/2 = 3, remainder is 0
3/2 = 1, remainder is 1
1/2 = 0, remainder is 1

$(845)_{10}$ is 1101001101

2. Convert the following decimal numbers to hexadecimal numbers. Make sure and show your work per Example 1.5 from the textbook. You can start on either the right or left. If you do not show your work, you will receive 0 pts. Each correct answer is work 2 pts.

a. 52

52/16 = 3.25 | .25*16 = 4 ↑
3/16 = 0.18 | .18*16= 3

$(52)_{10}$ is $(34)_{16}$

b. 339

339/16 = 21.18 | .18*16 = 3 ↑
21/16 = 1.31 | .31*16= 5
1/16= 0.06 | .06*16= 1

$(339)_{10}$ is $(153)_{16}$

c. 711

711/16 = 44.43 | .43*16 = 7 ↑
44/16 = 2.75 | .75*16= 12 = C
2/16= 0.125 | .125*16= 2

$(711)_{10}$ is $(2C7)_{16}$

3. Convert the following unsigned binary numbers to decimal numbers. Make sure and show your work per Figure 1.5 from the textbook. If you do not show your work, you will receive 0 pts. Each correct answer is work 2 pts.

a. 1110

(1x2^3) + (1x2^2) + (1x2^1) + (0x2^0) =
8 + 4 + 2 + 0 **= 14**

1110 is $(14)_{10}$

b. 100100

(1x2^5) + (0x2^4) + (0x2^3) + (1x2^2) + (0x2^1) + (0x2^0) =
32 + 0 + 0 + 4 + 0 + 0 **= 36**

100100 is $(36)_{10}$

c. 11010111

(1x2^7) + (1x2^6) + (0x2^5) + (1x2^4) + (0x2^3) + (1x2^2) + (1x2^1) + (1x2^0) =
128 + 64 + 0 + 16 + 0 + 4 + 2 + 1 **= 215**

11010111 is $(215)_{10}$

4. Convert the following hexadecimal numbers to decimal numbers. Make sure and show your work per Figure 1.6 from the textbook. If you do not show your work, you will receive 0 pts. Each correct answer is work 2 pts.

a. 7C

(7x16^1) + (Cx16^0) =
(7x16) + (12x1) **= 124**
$(7C)_{16}$ is $(124)_{10}$

b. FFF

(Fx16^2) + (Fx16^1) + (Fx16^0) =
(15x256) + (15x16) + (15x1) = **4095**
$(FFF)_{16}$ is $(4095)_{10}$

c. FB001

(Fx16^4) + (Bx16^3) + (0x16^2) + (0x16^1) + (1x16^0) =
(15x65536) + (11x4096) + (0x256) + (0x16) + (1x1) = **1028097**
$(FB001)_{16}$ is $(1028097)_{10}$

5. Convert the following two's complement binary numbers to decimal numbers. Make sure and show your work per slides 58 and 59 of the Chapter 1 PowerPoint. If you do not show your work, you will receive 0 pts. Each correct answer is work 2 pts.

a. 1010

1010	is negative, so
0101	ones complement
0110	twos complement

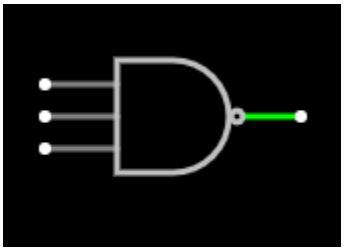
(0x2^3) + (1x2^2) + (1x2^1) + (0x2^0) =
0 + 4 + 2 + 0 **= 6**
1010 is (-6) $_{10}$

b. 100011

100011	is negative, so
011100	ones complement
011101	twos complement

(0x2^5) + (1x2^4) + (1x2^3) + (1x2^2) + (0x2^1) + (1x2^0) =
0 + 16 + 8 + 4 + 0 + 1 **= 29**
100011 is (-29) $_{10}$

6. Draw the symbol and truth table for a three-input NAND gate.
Use the Falstad circuit simulator per class demonstration and attach the image of the logic gate symbol (4 pts).



Fill in the truth table below, each correct row is worth 1 pt.

A	**B**	**C**	**Y**
0	0	0	1
0	0	1	1
0	1	0	1
1	0	0	1
1	1	0	1
0	1	1	1
1	0	1	1
1	1	1	0