Denis Daci 61 Workshop 1

Part 2.

3. 0 b | 11 00 | 1100 | 1 0 1 0 | 1 1 0 -

12 8 10 6

Hex C 8 A 6

positive of binary number

$= 2^{15} + 2^{14} + 2^{11} + 2^7 + 2^5 + 2^2 + 2^1$

$= 32768 + 16384 + 2048 + 128 + 32 + 4 + 2 =$

$= -14120$

4. Hex 0xA3D4

A | 3 | D | 4

binary 1010 | 0011 | 1101 | 0100

15 14 13 12 | 11 10 9 8 | 7 6 5 4 | 3 2 1 0

Dec $-2^{15} + 2^{13} + 2^9 + 2^8 + 2^7 + 2^6 + 2^4 + 2^2$

$-32768 + 8192 + 512 + 256 + 128 + 64 + 16 + 4$

$= -23596$

5. 22 positive

0000 | 0000 | 0100 | 0110) keep last

flip to negative 1111 | 1111 | 1011 | 1001

15 15 11 3

F F B 9

6.

	1	6	C	2
binary	0001	0100	1100	0010

$1(16^3) + 6(16^2) + 12(16^1) + 2(16^0) = 5826$

7. 0 100 | 1010 | 0101 | 0101

4 10 5 5

4 A 5 5

$5(16^0) + 5(16^1) + 10(16^2) + 4(16^3) = 19029$

8. -33

33 positive 0000 | 0000 | 0010 | 0001

flip to negative 1111 | 1111 | 1101 | 1111

F F D F

0 b | 1100 | 1110 | 0111 | 1010

12 14 7 10

Hex C E 7 A

$-2^{15} + 2^{14} + 2^{11} + 2^{10} + 2^{9} + 2^{6} + 2^{5} + 2^{4} + 2^{3} + 2^{1} = -12678$

10.

F	7	2	13
1111	0111	0010	1011

$-2^{15} + 2^{14} + 2^{13} + 2^{12} + 2^{10} + 2^{9} + 2^{8} + 2^{5} + 2^{4} + 2^{1} + 2^{0}$

$= -2261$

11. 0b 0000 | 1110 | 0111 | 0100

0 14 7 4

0 E 7 4

$0 \cdot (16^3) + 14 \cdot (16^2) + 7 \cdot 16 + 4 \cdot (1)$

12

16 | 20713

R5 R0 R14 R9

5 | 0 | 14 | 9

5 0 E 9

5 | 0 | E | 9

0101 | 0000 | 1110 | 1001

12 0 1 00|00 11 1 | 1 0 11 | 0000

4 | 3 | B | 0

$2^6 + 2^1 + 2^0 = 67$

$1/2 + 1/8 + 1/16 = .6875 = 67.6875$

Final answers

2. Fill in the missing columns of the following table, you should have your binary values in 2's complement form and be at most 16 bits (4 points each blank)

decimal	binary	hexadecimal
37	0b0000000000100101	0x0025
-37	0b1111111111011011	0xFFDB
-14170	0b1100100010100110	0xC8A6
-23596	0b1010 0011 1101 0100	0xA3D4
-77	0b 1111 1111 1011 0011	0xFFB3
5826	0b0001 0110 1100 0010	0x16C2
19029	0b0100101001010101	0x4A56
-33	0b 1111 1111 1101 1111	0xFFDF
-18678	0b1100111001111010	0xCE7A
-2261	0b 1111 0111 0010 1011	0xF72B
8700	0b0000111001110100	0x0E74
20713	0b 0101 0000 1110 1001	0x50E9

3. Fill in the missing columns of the following table, For this problem you should have your binary values in 2's complement form and have 8 bits before the binary point and 8 bits after the binary point. (4 points each blank)

decimal	binary	hexadecimal
37.125	0b00100101.00100000	0x25.20
-37.125	0b11011010.11100000	0xDA.E0
12,2109375	0b00001100.00110110	0x0C,36
-109,4257 8125	0b1001 0010.1001 0011	0x92.93
-67.75	0b1011 1100.0110 0000	0xBC,60
97,94140625	0b 0110 0001.1111 0001	0x61.F1
-10,6992187	0b11110101.01001101	0xF5,4D
113,101562	0b01110001.00011010	0x71.1A
121,195312	0b 0111 1001.0011 0010	0x79.32
-112.0625	0b1000 1111.1111 0000	0x8F,F0
103.078125	0b0110 0111.0001 0100	0x67,14
67,6015	0b01000011.10110000	0x43,B6