

Student Name:

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Lab 2

1. Give the two's complement form for the following numbers using 8 bits. **Show your work.** .
(Hint: Convert to binary and then convert to 2's complement).

a) -14

$$\begin{array}{r} 14/2 \quad 7 \quad 0 \uparrow \\ 7/2 \quad 3 \quad 1 \\ 3/2 \quad 1 \quad 1 \\ 1/2 \quad 0 \quad 1 \end{array}$$

$$\begin{array}{r} 0000 \ 1110 \\ 1111 \ 0001 \\ + 0000 \ 0001 \\ \hline 1111 \ 0010 \end{array}$$

b) -43

$$\begin{array}{r} 43/2 \quad 21 \quad 1 \uparrow \\ 21/2 \quad 10 \quad 1 \\ 10/2 \quad 5 \quad 0 \\ 5/2 \quad 2 \quad 1 \\ 2/2 \quad 1 \quad 0 \\ 1/2 \quad 0 \quad 1 \end{array}$$

$$\begin{array}{r} 0010 \ 1011 \\ 1101 \ 0100 \\ + 0000 \ 0001 \\ \hline 1101 \ 0101 \end{array}$$

2. What is the hex value for this string: "Groot".

47 72 6F 6F 74

3. Add these two numbers using two's complement scheme. (You may use 4 bit precision).

Show your work.

a) $3-1 =$

$$\begin{array}{r} 0011 \\ + 1111 \\ \hline 0010 \end{array}$$

$$\begin{array}{r} 0001 \\ 1110 \\ + 0001 \\ \hline (-1)_{10} = (1111)_2 \end{array}$$

b) $-5-2 =$

$$\begin{array}{r} 01 \\ + 1110 \\ \hline 0001 \ 1001 \end{array}$$

$$\begin{array}{r} 0101 \\ 1010 \\ + 0001 \\ \hline (-5)_{10} = (1011)_2 \end{array}$$

$$\begin{array}{r} 0010 \\ 1101 \\ + 0001 \\ \hline (1110)_2 = (-2)_{10} \end{array}$$

4. What is the binary value stored in Z after this operation?

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X = 0001 1000
Y = 0011 0011
  0001 0000
Z = X AND Y
Z = 0001 0000

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5. What is the binary value stored in Z after this operation?

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X = 0001 1000
Y = 0011 0011
  0011 1011
Z = X OR Y
Z = 0011 1011

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6. What is the binary value stored in Z after this operation?

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X = 0011 0011
  1100 1100
Z = NOT(X)
Z = 1100 1100

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