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Friday Lab #5
CSC 1301

1) 01100101
   a) first flip the number
   10011010 (one's compliment)
   b) then add 1
   10011011 (two's compliment)

2) 5 in 4 bits

   0101
   two's complement = 1011
   5 in 8 bits
   00000101
   two's complement = 11111011
   when increasing the number of bits , all the leading

zeros become ones for the two's compliment

2) the largest quantity is 127, or 01111111

the smallest number is -128, or 10000000

3)
```
  00110101      53
  00001100    + 12
  --------    ----
  01000001      65

     11
  01110110     118
+ 00000010   +   2
  --------   -----
  01111000     120

  00111101      61
+ 11111011   + (-5)
  --------   ------
  00111000      56
```

$$\begin{array}{r} 00001010 \\ +\ 10010101 \\ \hline 10011111 \end{array} \qquad \begin{array}{r} 10 \\ +\ (-107) \\ \hline -97 \end{array}$$

$$\begin{array}{r} 11111\ 1 \\ 11111110 \\ +\ 11011101 \\ \hline 11011011 \end{array} \qquad \begin{array}{r} -2 \\ +\ (-35) \\ \hline -37 \end{array}$$

$$\begin{array}{r} 11111110 \\ +\ 11111101 \\ \hline 11111011 \end{array} \qquad \begin{array}{r} -2 \\ +\ (-3) \\ \hline -5 \end{array}$$

4)

$$
\begin{array}{r}
10110111 \\
+\,01110110 \\
\hline
00101101
\end{array}
\qquad
\begin{array}{r}
-73 \\
+\,118 \\
\hline
45
\end{array}
$$

$$
\begin{array}{r}
00111101 \\
+\,00111011 \\
\hline
01111000
\end{array}
\qquad
\begin{array}{r}
61 \\
+\,59 \\
\hline
120
\end{array}
$$

$$
\begin{array}{r}
11111011 \\
+\,11111011 \\
\hline
11110110
\end{array}
\qquad
\begin{array}{r}
-5 \\
+\,(-5) \\
\hline
-10
\end{array}
$$

$$
\begin{array}{r}
10000001 \\
+\,10010001 \\
\hline
00010010
\end{array}
\qquad
\begin{array}{r}
-127 \\
+\,-111 \\
\hline
-238
\end{array}
$$

$$
\begin{array}{r}
1\ 111\ 1\ \ 1\ 1 \\
01111011 \\
+\,00111101 \\
\hline
10111000
\end{array}
\qquad
\begin{array}{r}
123 \\
61 \\
\hline
184
\end{array}
$$

$$
\begin{array}{r}
01111111 \\
10000001 \\
\hline
00000000
\end{array}
\qquad
\begin{array}{r}
127 \\
+\,(-127) \\
\hline
0
\end{array}
$$

5) floating point in digital systems represent a fraction of a whole number; for ex.

101.101 is $5\,{}^{5}/{}_{8}$

1×2^{-1} $\quad 0\times 2^{-2}$ $\quad 1\times 2^{-3}$ and so on

1) a) 3

   b) 13

   c) 59

   d) 5

2) a) 17

b) 161

c) 3311

d) 2985

3) a) hex - B

binary - 1011

b) hex - FA0

binary - 111110100000

c) hex - 2A

binary - 101010

d) hex – FFF

binary – 1111 1111 1111

4) a)
$$\begin{array}{r} 10110 \\ +\ 01101 \\ \hline 100011 \end{array}$$

b)
$$\begin{array}{r} 11001 \\ +\ 00101 \\ \hline 11110 \end{array}$$

c)
$$\begin{array}{r} 10110 \\ -\ 01101 \\ \hline 1001 \end{array}$$

d)
$$\begin{array}{r} 11111 \\ -\ 01011 \\ \hline 10100 \end{array}$$

5) a) 82CD
+1982
9C4F

convert to binary, then add, subtract

b) E2C
+ A3
ECF

c) FB28
−3254
C8D4

d) E2C
−A31
3FB