Name:____________________

Homework #1 Computer Organization
Due: February 1, 2019 (Friday) by 3:00 PM

1. Perform the following calculations (assume unsigned #'s with an infinite number of bits/digits):

(a)	(b)	(c)	(d)
1001110010_2	101001010_2	$A43E61_{16}$	$A43E61_{16}$
$+\underline{0110110111}_2$	$-\underline{010011101}_2$	$+\underline{7C7989}_{16}$	$-\underline{4A8E7A}_{16}$

2. Represent the following decimal numbers in binary using **16-bit** signed magnitude, one's complement, and two's complement:

decimal #	**signed magnitude 16-bits**	**one's complement 16-bits**	**two's complement 16-bits**
207_{10}			
-94_{10}			

3. Using 16-bits what is the range of values for each of the following representations: (You may leave your answer as an equation contain powers of 2.)

a) unsigned integers:

b) signed integers using two's complement:

4. What decimal (base 10) value is represented by the 32-bit signed, two's complement value FFFF 87F6_{16}? (The 32-bits two's complement value is shown as a hexidecmal so I did not need to write a 32-bit binary number.)

5. Use Booth's algorithm to calculate the 16-bit product of 10101101_2 x 11101011_2. (Show your work on a separate page)

Name:____________________

6. Convert -108.53125_{10} to its 32-bit IEEE-754 floating point representation.

7. Suppose A, B and C are normalized 32-bit IEEE 754 floating point variables with A having a real value of $1.101_2 \times 2^{90}$ and B having a real value of $1.11_2 \times 2^{31}$. After the high-level language assignment statement "C = A+B", why is C's value equal to A's value and not the *mathematically* correct sum?
(A's normalized 32-bit IEEE 754 representation would be: `0 11011001 10100000000000000000000`)
(B's normalized 32-bit IEEE 754 representation would be: `0 10011110 11000000000000000000000`)

8. For the same values of A and B in question 7, would the high-level language assignment statement "C = A+B" assign C the *mathematically* correct sum if A, B and C were using the 64-bit IEEE 754 floating point format? (explain your answer)