Name:_____

Homework #1 Computer Organization
Due: September 7, 2017 (Thursday) by 4:00 PM

1. Perform the following calculations (unsigned and infinite number of bits/digits):

(a)	(b)	(c)	(d)
11110110_2	1001000_2	$E952E_{16}$	$E952E_{16}$
$+01100011_2$	-0111101_2	$+5AE74_{16}$	$-5AE74_{16}$

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**
92_{10}			
-40_{10}			

3. Using 16-bits what is the range of values for each of the following representations: (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 A7E9$_{16}$? (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 14-bit product of 1100101_2 x 1101101_2.

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6. Convert -179.375_{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 $1.1011_2 \times 2^{60}$ and B having a real value of $1.01_2 \times 2^{20}$. 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 10111011 10110000000000000000000)
(B's normalized 32-bit IEEE 754 representation would be: 0 10010011 01000000000000000000000)

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)