Name: Dmitry Landy

HOMEWORK #1 – Week #1

This homework assignment is worth 10% of your course grade..

Read each problem carefully. Failure to follow the instructions for a problem will result in a zero score for that problem.

Submit the completed Homework via Assignment in LEO

1. How many milliseconds (ms) are in one second? **1,000 milliseconds**

2. How many microseconds (us) are in one second? **1,000,000 microseconds**

3. How many bytes are in 20 megabytes? **20,000,000 bytes**

4. Convert the number below from a **binary** number to a **hexadecimal** number

$\overset{000}{\underbrace{\hspace{1em}}_{1}} \underbrace{1001}_{3} \underbrace{1010}_{5} \underbrace{1011}_{11=B} \underbrace{1011}_{7} . \underbrace{0111}_{8} \underbrace{1000}_{}$

A = 10   B 4 2 1
B = 11   - - - -
C = 12
D = 13
E = 14
F = 15

$\overline{\text{ANSWER}} = \boxed{135B.78}$

5. Convert the number below from a **binary** number to a **decimal** number.

1 0 0 0 0 0 0 0 1 1 0 . 0 1 1

1024 512 256 128 64 32 16 8 4 2 1 . $\frac{1}{2}\frac{1}{4}\frac{1}{8}$

1024 + 4 + 2 . ·250 + .125

$\overline{\text{ANSWER}} = \boxed{1030.375}$

6. Convert the **hexadecimal** number **below to a binary** number

A = 10   E = 14
B = 11   F = 15
C = 12
D = 13

89 A. 0 C

8 = 1000   9 = 1001   A = 1010 .   0 = 0000   C = 1100

8 4 2 1   ANSWER = $\boxed{100010011010.000011}$

7. What is the decimal equivalent of the IEEE 754 binary floating point number shown below?

0 1000 0001 0110 0000 0000 0000 0000 000

+ Sign   Exponent (129)   Significand
.011 = .375

$\pm 2^{(E-127)}\left(1 + \frac{5}{2^{23}}\right)$

ANSWER

$2^{(129-127)}(1.375) \rightarrow 2^2 \times 1.375 = 4 \times 1.375 = \boxed{5.5}$

For problems 8, 9 and 10, convert the following decimal numbers into **8bit binary numbers** as required for **2's complement** math, and perform the indicated operations. <u>Circle or **bold** your binary answer and **show your work**</u>.

Notes:

● Remember that positive numbers are represented in sign-magnitude format in 2's complement math

8.

```
        128 64 32 16 8 4 2 1
             1 1 1 1
   +38 = 0 0 1 0 0 1 1 0
   +30 = 0 0 0 1 1 1 1 0
   +68 = 0 1 0 0 0 1 0 0        (< ANSWER)
```

9.

```
        128 64 32 16 8 4 2 1

             1 1     1 1
   +38 = 0 0 1 0 0 1 1 0
 > - 30 = 1 1 1 0 0 0 1 0
   +08 = 0 0 0 0 1 0 0 0        (< ANSWER)
```

<u>2's Complement of 30</u>
0 0 0 1 1 1 1 0 (this is +30)

```
               1
  1 1 1 0 0 0 0 1 (1's Complement of 30)
+            1
  1 1 1 0 0 0 1 0 (2's Complement of 30 AKA -30)
```

10.

```
        128 64 32 16 8 4 2 1

               1 1 1 1
 > - 38 = 1 1 0 1 1 0 1 0
   +30 = 0 0 0 1 1 1 1 0
   - 08 = 1 1 1 1 1 0 0 0  (< ANSWER)
```

<u>2's Complement of 38</u>
0 0 1 0 0 1 1 0 (This is +38)

```
             1
  1 1 0 1 1 0 0 1 (1's Complement of 38)
+            1
  1 1 0 1 1 0 1 0 (2's Complement of 38 AKA -38)
```