**CIS 21JA - Assignment 1 Name: Jason Hammar**

1. (1/2pt) The most significant bit in a binary word is bit number \_15\_\_\_\_\_

2. (1 pt)The range of ASCII values is from 0 to 127.

With this range, are the numbers signed or unsigned data? \_\_\_\_unsigned\_\_\_\_\_

How many bits is needed to represent a data value between 0 and 127? \_128\_\_\_\_\_\_

3. (1pt) Show your first initial (first letter of your first name) as it would appear in computer memory, as a binary value: \_\_\_\_01001010\_\_\_\_\_\_\_\_ and as a hexadecimal value: \_\_\_\_\_4A\_\_\_\_\_\_

*Note: To get credit for questions 4-8: show all work and read the problem statement carefully so your answer is in the correct size* *for the data.*

4. (1.5pt) Convert decimal 23 to binary, and show the result as a byte of data.  
23/2 = 11R1 11/2 = 5R1 5/2 = 2R1 2/2 = 1R0 1/2 = 0R1

Answer: 23 decimal is 1011 1000 binary  
5. (1.5pt) Convert decimal -16 to hexadecimal, and show the result as a word of data.  
Absolute value of -16 is 16.

16/2 = 8R0 8/2 = 4R0 4/2 = 2R0 2/2 = 1R0 1/2 0R1

Answer: 16 decimal is 00010000 binary, when using two's compliment to make it negative it ends up being 11101111 binary.

when as a word, 11101111 is 0000000011101111

When converted to hexadecimal, it ends up being FFEF  
6. (1.5pt) Convert the *unsigned* hexadecimal value B5 to a binary byte of data.  
B = 1011 5 = 0101

Answer: B5 hexadecimal is 10110101 binary.  
7. (1.5pt) Convert the *signed* hexadecimal byte B5 to decimal.  
B5 = 10110101

(2^7 x 1) + (2^6 x 0) + (2^5 x 1) + (2^4 x 1) + (2^3 x 0) + (2^2 x 1) + (2^1 x 0) + (2^0 x 1)

128 + 0 + 32 + 16 + 0 + 4 + 0 + 1 = 181

The original binary part of the number started with one, so therefore the answer is negative and you multiply 181 by -1.

Answer: B5 hexadecimal is -181 signed decimal.

8. (1pt) Do the following binary subtraction in the same way that the CPU would do the subtraction. Show the result of the subtraction as a byte of data  
 1001 1000 – 1010 0100

absolute value of 1010 0100 is 0101 1011

two's compliment: 0101 1011 + 1 = 0101 1010

1001 1000 + 0101 1010 = 1100 0011

Answer: 1100 0011  
  
9. (1/2pt) If X is false, Y is true, and Z is false, show the result of: X xor (Y and Z)

Answer: False

10. (6pts) Follow the instructions at the link "Setting up your IDE for MASM" (in module 1) to set up the IDE with an assembly language project that you can use for the rest of the quarter to write your assembly programs.

Then do the following steps to complete the work:

* At the Solution Explorer window of the IDE, right click on the hello.asm name and select "Remove". This will remove the hello.asm file from the project.
* Download the assignment1.asm file. Then right click on the Project name and select "Add Existing Item". Find the assignment1.asm file and select it to add it to the project.
* Follow the instruction in the assignment1.asm file to modify the code.
* Build and run the program.
* Take a screen shot (or a take a picture) of your program output (the black screen with output text) and paste it in the space below. Make sure you paste *an image* of the output window, don't just copy the ouptut text in the window.

(Sorry that the words are small, I haven's figured out how to zoom in)

