

Homework 3

Problem 1

Consider the following C expressions:

```
short s = -7
unsigned short us = s;
int i = -128;
unsigned int ui = i;
```

Assume we are running code on an **8-bit** machine using two's complement for signed integers. Also assume that right shifts of signed values are performed **arithmetically**. A “short” integer is encoded using **4 bits**. Fill in the blanks in the table below.

Expression	Binary Representation
(int) -13	
us	
ui	
(i << 1) - 1	
(s >> 2) << 1	
(us >> 2) << 1	
(i >> 2) - (ui >> 2)	

Problem 2

In C language, if an evaluation expression contains both unsigned and signed values, then signed values will be implicitly casted into unsigned ones before evaluation. Please fill the following table with “<”, “>” or “==”. (Assume int value is encoded using 16 bits)

Constant A	Constant B	Relation
-1	0U	>
-1	0	
-1U	-2U	
-1	65535U	
-32768	32768U	

Problem 3

Solve the following formula group. Notice that each value is represented by unsigned integer of 4-bits. Explain your answer step by step.

$$0010*x + 0100*y = 1010 \quad (a)$$

$$0100*x + 0010*y = 1000 \quad (b)$$

/*

*Your solution:

*Add on here

*/

Result: x = , y =

Problem 4

Execute the following code on your machine. What is the output of the program? Explain the reason briefly and correct the error if necessary.

```
#include <stdio.h>
#include <string.h>

int main() {
    int x = 3;
    char *s = "abcde";
    int y = (3 - strlen(s)) / 2;
    printf("%d\n", y);
    return 0;
}
```