

Homework 3 Solution

Problem 1

Expression	Binary Representation
(int) -13	1111 0011
us	1001
ui	1000 0000
(i << 1) - 1	1111 1111
(s >> 2) << 1	1100
(us >> 2) << 1	0100
(i >> 2) - (ui >> 2)	1100 0000

Problem 2

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

Problem 3

What should be clarified first is that multiplications can be done with multiple shift and add operations.

The right side of equation (a) is 1010, indicating the least significant bit of x must be 1. Similarly, the right side of equation (b) is 1000, indicating the least significant bit of y must be 0. However, the factor of x in (b) is 0100, while the right side is 1000. Therefore, we can assert that carry should occur in (b), meaning that the third bit of y must be 1.

At this time, x is "XXX1 and y is "XX10". We have already found the answer. Other unclear bits of x and y should assure that the shift and add operation will only lead to overflow of the result.

Possible results are

x = 0001 y = 0010

x = 1001 y = 0010

x = 0001 y = 1010

x = 1001 y = 1010

Problem 4

The error is caused by the return type of `strlen()` function. As it is unsigned value will be cast to signed value.

Correct: `int y = (x - (int)strlen(str))/2`