**CS 4400 - Problem Set 2**

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1. Problem 2.71:  
   1. When the extracted byte begins with a 1, this code does not sign extend it with 1s.
   2. Here is my implementation of the function, using only left and right shifts, along with one cast (I couldn't figure out how to do it with one subtraction, but this works):

**int** **xbyte**(packed\_t word, **int** bytenum)

{

**return** ((**int**)((word >> (bytenum << 3)) << 24) >> 24);

}

1. Problem 2.74:

**int** **tsub\_ok**(**int** x, **int** y)

{

**int** ok = 1;

**int** result = x - y;

**if** ((x >= 0 && y < 0 && result < 0) || (x < 0 && y > 0 && result > 0)) {

ok = 0;

}

**return** ok;

}

1. Problem 2.76:  
   1. K = 17:  
        
       (x << 4) + (x << 0)
   2. K = -7:  
        
       (x << 0) - (x << 3)
   3. K = 60:  
        
       (x << 6) - (x << 2)
   4. K = -112:  
        
       (x << 4) - (x << 7)
2. Problem 2.77:

**int** **divide\_power2**(**int** x, **int** k)

{

/\*

\* 1. Create a mask that is -1 if x is negative, 0 otherwise.

\* 2. Use the mask to create a bias that is (2^k - 1) if x is

\* negative, 0 otherwise.

\* 3. Add the bias to x and shift the result.

\*/

**int** mask = (~((x >> 31) & 1)) + 1;

**int** bias = mask & ((1 << k) - 1);

**return** (x + bias) >> k;

}