**CS 4400 - Problem Set 4**

**Rob Johansen**

**u0531837**



1. Problem 3.56:  
   1. %esi holds x  
      %ebx holds n  
      %edi holds result  
      %edx holds mask
   2. The initial value of result is -1  
      The initial value of mask is 1
   3. The test condition for mask is: mask != 0
   4. This is how mask gets updated: mask = mask << n
   5. This is how result gets updated: result ^= mask & x
   6. Here is the entire function, with all code filled in:

**int** **loop**(**int** x, **int** n)

{

**int** result = -1;

**int** mask;

**for** (mask = 1; mask != 0; mask = mask << n) {

result ^= mask & x;

}

**return** result;

}

1. Problem 3.58. Here's the function with the missing code. Note that I removed the default case because it did nothing anyway:

**int** **switch3**(**int** \*p1, **int** \*p2, mode\_t action)

{

**int** result = 0;

**switch** (action) {

**case** *MODE\_A*:

result = \*p1;

\*p1 = \*p2;

**break**;

**case** *MODE\_B*:

result = \*p2;

result += \*p1;

\*p2 = result;

**break**;

**case** *MODE\_C*:

\*p2 = 15;

result = \*p1;

**break**;

**case** *MODE\_D*:

\*p2 = \*p1;

**case** *MODE\_E*:

result = 17;

}

**return** result;

}

1. Problem 3.62:  
   1. The value of M is 13
   2. %ecx holds value *j*  
      %edi holds value *i*
   3. The compiler recognizes that only two elements will actually be transposed during each iteration of the loop: The topmost "column" element and its corresponding leftmost "row" element. The following diagram illustrates the elements of array *A* that will be transposed (those with matching colors):

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Here is a C code version of the transpose() function that makes use of these optimizations: