Lab Exercise #4 -- Integer Operations

1. Examine the C program below, and give the value displayed by the program for each output operation.

#include <stdio.h>

int main()
{
    signed int AAA = 0x7d0000f2, BBB = 0xb500004e;
    unsigned int CCC = 0x7d0000f2, DDD = 0xb500004e;

    printf( "\nUnary Operations\n" );
    printf( "%08x", -AAA ); /*                       */
    printf( "%08x", ~AAA ); /*                       */
    printf( "%08x", -BBB ); /*                       */
    printf( "%08x", ~BBB ); /*                       */

    printf( "\nBinary Bitwise Operations (signed)\n" );
    printf( "%08x", AAA & BBB ); /*                 */
    printf( "%08x", AAA ^ BBB ); /*                 */
    printf( "%08x", AAA | BBB ); /*                 */
    printf( "%08x", AAA << 4 ); /*                 */
    printf( "%08x", BBB << 4 ); /*                 */
    printf( "%08x", AAA >> 12 ); /*                */
    printf( "%08x", BBB >> 12 ); /*                */

    printf( "\nBinary Bitwise Operations (unsigned)\n" );
    printf( "%08x", CCC & DDD ); /*                 */
    printf( "%08x", CCC ^ DDD ); /*                 */
    printf( "%08x", CCC | DDD ); /*                 */
    printf( "%08x", CCC << 4 ); /*                 */
    printf( "%08x", DDD << 4 ); /*                 */
    printf( "%08x", CCC >> 12 ); /*                */
    printf( "%08x", DDD >> 12 ); /*                */
Binary Arithmetic Operations (signed)

printf( "%08x\n", AAA + BBB );           /* ______________________________ */
printf( "%08x\n", AAA - BBB );           /* ______________________________ */
printf( "%08x\n", BBB - AAA );           /* ______________________________ */
printf( "%08x\n", AAA * 16 );            /* ______________________________ */
printf( "%08x\n", BBB * 16 );            /* ______________________________ */
printf( "%08x\n", AAA / 4096 );          /* ______________________________ */
printf( "%08x\n", BBB / 4096 );          /* ______________________________ */
printf( "%08x\n", AAA % 4096 );          /* ______________________________ */
printf( "%08x\n", BBB % 4096 );          /* ______________________________ */

Binary Arithmetic Operations (unsigned)

printf( "%08x\n", CCC + DDD );           /* ______________________________ */
printf( "%08x\n", CCC - DDD );           /* ______________________________ */
printf( "%08x\n", DDD - CCC );           /* ______________________________ */
printf( "%08x\n", CCC * 16 );            /* ______________________________ */
printf( "%08x\n", DDD * 16 );            /* ______________________________ */
printf( "%08x\n", CCC / 4096 );          /* ______________________________ */
printf( "%08x\n", DDD / 4096 );          /* ______________________________ */
printf( "%08x\n", CCC % 4096 );          /* ______________________________ */
printf( "%08x\n", DDD % 4096 );          /* ______________________________ */

Masking Operations

printf( "%08x\n", CCC & 0xffff );        /* ______________________________ */
printf( "%08x\n", CCC | 0xffff );        /* ______________________________ */
printf( "%08x\n", DDD & 0xffff );        /* ______________________________ */
printf( "%08x\n", DDD | 0xffff );        /* ______________________________ */

2. When you have completed your work, use the program in "lab04.ops.c" to check your work. While positioned in one of your own directories, use the following commands to translate, link and execute the program:

   gcc /user/cse320/Labs/lab04.ops.c
   a.out

3. The file "lab04.outline.c" contains a C program which repeatedly prompts the user to enter a signed integer value, then displays that number in decimal. Copy that program into your account and revise it as specified in the comments.