MTH 307: Programming and Data Structures

Homework II

(Due 23/02)

1. What is the output produced by each of the following program fragments. Assume that `i,j,` and `k` are `int` variables.

   (a)
   ```
   i = 1; j = 2; k = 3;
   printf("%d",(i+5)%(j+2)/k);
   ```

   (b)
   ```
   i = 7; j = 8; k = 9;
   printf("%d",(i+10)%k/j);
   ```

   (c)
   ```
   i = 1; j = 2; k = 3;
   i -= j -= k;
   printf("%d %d %d",i,j,k);
   ```

   (d)
   ```
   i = 2; j = 1; k = 0;
   i *= j *= k;
   printf("%d %d %d",i,j,k);
   ```

   (e)
   ```
   i = 7;
   j = 6 + (i=2.5);
   printf("%d %d",i,j);
   ```

   (f)
   ```
   i = 2; j = 8;
   j = (i=6) + (j=3);
   printf("%d %d",i,j);
   ```

   (g)
   ```
   i = 3; j = 4; k = 5;
   printf("%d",i++ - j++ + --k);
   printf("%d %d %d",i,j,k);
   ```

   (h)
   ```
   i = 7; j = 8;
   printf("%d",i++ - --j);
   printf("%d %d",i,j);
   ```

   (i)
   ```
   i = 7;
   j = 3 * i-- + 2;
   printf("%d %d",i,j);
   ```

   (j)
   ```
   i = 7;
   j = 3 + --i * 2;
   printf("%d %d",i,j);
   ```

2. Write a `C` program for each of the following tasks.

   (a) Accepting an integer from the user and then displaying it in binary, octadecimal, or hexadecimal format, depending on the choice of the user using the `switch` statement.

   (b) Accepting a positive integer $n > 5$ from the user and printing all Pythagorean triplets involving positive integers $\leq n$. Note that equivalent triplets should be printed only once. (For example, (4,3,5) and (3,4,5) are equivalent.)

(c) Writing a function that determines whether a given number is perfect. (A number is *perfect* if the sum of the factors of the number excluding the number itself equals the number). Then invoke this function repeatedly to determine the number of perfect numbers in a range given by the user.

(d) Accept a string from the user and determine whether it is a palindrome. (For example, "Eva, can I see bees in a cave" is a palindrome.)