Exercises - Problems Sheet # 0: Revision on C Basics, & Functions (Recursion)

No. Of Questions: 22 **No. Of Pages: 3**

- **To be submitted during the Labs of week 4 (Starting on Saturday the 29th of February).**
- **Students will lose 2 marks if this homework is not delivered on time or found out to be copied.**
- **The submitted solutions should be handwritten and NOT typed/printed.**

Answer the following:

1) Write a C program to print the following line as shown below:

Welcome!
You are able to test your skill of writing C code here.

2) Write a C program to declare two integer and one float variables, then initialize them to 10, 15, and 12.6. It then prints these values on the screen.

3) Write a C program to prompt the user (i.e. ask the user) to input 3 integer values and print these values in the reversed order.

4) Given the following pseudo code, write a program that executes it.

a. read x
b. read y
c. compute p = x y
d. compute s = x + y
e. total = s^2 + p (s – x) (p + y)
f. print total

5) Write a C program that finds the area of a triangle. Note: a triangle's area = 0.5 * base * height

6) Write a C program that prompts the user to input three integer values and find the greatest value of those three values.

7) Write a program that determines a student's grade. The program will read three scores and determine the grade based on the following rules:

- if the average score >= 90% => grade = A
- if the average score >= 70% and < 90% => grade = B
- if the average score >= 50% and < 70% => grade = C
- if the average score < 50% => grade = F

8) Write a C program that finds whether a number is even or odd.

9) Write a C program that compares two numbers a and b. The output of this comparison is whether the two numbers are equal, that a is greater, or that b is greater.

10) Write a C program that finds the type of a triangle when its three angles are given.

- If all angles are equal, it is an equilateral triangle.
- If any two angles are equal, it is an isosceles triangle.
- If all angles are different, it is an acute triangle.

11) Write a C program that prompts the user to choose an operation to do on 2 input integers. The operations are addition, subtraction, multiplication, and division. Note: the program should not allow the division by zero.

12) Write a C program that will print the following pattern:

```
*******
******
*****
****
***
**
*
```

13) Write a C program that will print the following pattern:

```
*
***
*****
*******
*********
*********
*******
*****
***
*
```

14) Write a C program that finds the sum of the first n natural numbers.

15) Write a C code that finds the sum of the digits of a number.

16) Repeat the problem no. 11 but with an 'Exit' option; that is, the program allows the user to enter new values and choose the required operations until the user chooses to exit.

17) Repeat the problems from 5 to 16 using functions, and you should call them from the main. The functions should return a value to the main and the main is responsible for printing the output.

18) Write a program that will:

- Prompt the user to input ten integer values.
- Calculate the smallest and the greatest of those values.
- Call a function to calculate the difference between those smallest and greatest values.
- Finally: displays the entered ten integers, the difference between the smallest and greatest values, and the value that occurs the most.

19) Write a C program to find the sum of the first n natural numbers using recursion.
Note: Positive integers are known as natural numbers.

20) Write a C program to check whether a number is a prime number or not, by using recursion.

21) Write a C program to reverse a string, by using recursion.

22) What does the following program do?

5.43 What does the following program do?

```c
#include <stdio.h>

int mystery( int a, int b ); /* function prototype */

/* function main begins program execution */
int main( void )
{
   int x; /* first integer */
   int y; /* second integer */

   printf( "Enter two integers: " );
   scanf( "%d%d", &x, &y );

   printf( "The result is %d\n", mystery( x, y ) );
   return 0; /* indicates successful termination */
} /* end main */

/* Parameter b must be a positive integer
   to prevent infinite recursion */
int mystery( int a, int b )
{
   /* base case */
   if ( b == 1 ) {
      return a;
   } /* end if */
   else { /* recursive step */
      return a + mystery( a, b - 1 );
   } /* end else */
} /* end function mystery */
```

With our best wishes;