Computer Programming [CS F111] Lab 4

Practice Problems:

1. Write a C program to find the Roots of a Quadratic Equation. The program should also print imaginary roots and repeated roots in case of perfect square.

   Input: 1 -5 6
   Output:
   3.000000
   2.000000

   Input: 1 1 1
   Output:
   -0.500000+0.866025i
   -0.500000-0.866025i

   Code:

```c
#include<stdio.h>
#include<math.h>
typedef long long ll;
int main()
{
        ll a,b,c;
        double d, ans1, ans2;
        scanf("%lld %lld %lld",&a,&b,&c);
        d=b*b-4*a*c;
        if(a==0)
        {
                printf("-1\n");
                return 0;
        }
        if(d<0){
                d=d*-1;
                printf("%lf+%lfi\n",(double)b*-1/(2*a),sqrt(d)/(2*a));
                printf("%lf-%lfi\n",(double)b*-1/(2*a),sqrt(d)/(2*a));
                return 0;
        }
        else{
                ans1=(-1*b)/(double)(2*a)+sqrt(d)/(2*a);
```

```
                        ans2=(-1*b)/(double)(2*a)-sqrt(d)/(2*a);
                        printf("%lf\n%lf\n",ans1,ans2);
                }
        }
```

2. Write a C program to find first N Fibonacci Numbers. The first two numbers in the Fibonacci sequence are 0 and 1 and each subsequent number is the sum of the previous two numbers. The formula for this program is: $P_i = P_{i-1}+P_{i-2}$ where P_i (i^{th} number) is the sum of P_{i-1} (i-1th) and P_{i-2} (i-2th) numbers. Note that keep N<90 because 90th number of Fibonacci sequence might not be in the range of "longlong" data type.

Input: 0 1 10
Output: 0 1 1 2 3 5 8 13 21 34

Code:

```
#include<stdio.h>
int main()
{
        long long a,b,c,n;
        scanf("%lld %lld %lld",&a,&b,&n);
        if(n==1)
                printf("%lld\n",a);
        else{
                printf("%lld %lld ",a,b);
                i=2;
                while(i<n)
                {
                        c=a+b;
                        printf("%lld ",c);
                        a=b;
                        b=c;
                        i++;
                }
                printf("\n");
        }
}
```

3. Write program to count and print the number of negative and positive numbers in a given set of numbers. Test your program with a suitable set of numbers. Use **scanf** to read the numbers. Reading should be terminated when the value 0 is encountered.

Input/output:

Input: 10 -10 12 -12 11 -11 0

Output: positive: 3 negative: 3

Input: 1 2 3 4 5 6 7 8 9 0

Output: positive: 9 negative: 0

Code:

```c
#include <stdio.h>
void main()
{
  int pos = 0,neg = 0;
  int t;
  scanf("%d",&t);
  while(t != 0)
  {
    if(t < 0)
      neg++;
    else if(t > 0)
      pos++;
    scanf("%d",&t);
  }
  printf("positive: %d negative: %d",pos,neg);
}
```

4. Write a C program to print the sum of harmonic series: $\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+...+\frac{1}{n}$ where $n \geq 1$.

Input/output:

Input: 1
Output: 1.000000

Input: 5
Output: 2.283333

Input: 800
Output: 7.262452

Code:

```c
#include<stdio.h>
int main()
```

```c
{
    int n;
    double sum=0;
    scanf("%d",&n);
    i=1;
    while(i<=n)
    {
        sum=sum+1/(double)i; //explicit type casting
        i++;
    }
    printf("%lf\n",sum);
}
```

****

Exercises:

1. Following the practice problem 2, now write a C program to print first N **alternate** Fibonacci Numbers.

NOTE : Upload the screenshots of the **Exercise programs** along with the displayed results into your corresponding Google Classroom.

PATH to Submit the Screenshots:
`Google Classroom --> Classwork --> View Assignment --> Create/Upload files`

** GOOD LUCK **