Sample Midterm Exam

Question # 1

- Write a C program that should get temperatures (integer numbers) entered by a user to display the following results:
  - Average temperature
  - Lowest temperature
  - Highest temperature
  - Absolute difference between the lowest and highest
- User enters the numbers one at a time in a mixed order. Entering zero indicates termination of data-entry.

Answer

```
#include <iostream>
using namespace std;
int main(int argc, char* argv[]){
    int temperature ;
    double average,absAverage ;
    int sum=0 ;
    int minTemperature,maxTemperature ;
    int numOfTemperatures=0;
    cout << "\n Enter temperature values:\n" ;
```

```
while(true){
        cin >> temperature ;
        if (temperature==0) break ;
        sum += temperature ;
        if (numOfTemperatures==0){
           maxTemperature=temperature ;
           minTemperature=temperature ;
        }
      if (temperature>maxTemperature)
           maxTemperature=temperature ;
      if (temperature<minTemperature)
           minTemperature=temperature ;
        numOfTemperatures++;
     }
```

```
    average = (double)sum / numOfTemperatures ;
    cout << "\n Average=" << average ;
    cout << "\n Absolute Average=" << absAverage ;
    cout << "\n Minimum=" << minTemperature ;
    cout << "\n Maximum=" << maxTemperature ;
   cout << "\n" ;
    return 0;
}
```

Question # 2

- The Fibonacci sequence is 0, 1, 1, 2, 3, 5, 8, 13, 21, … where the first two terms are 0 and 1, and each term thereafter is the sum of the two preceding terms. Draw a flowchart and then write a C program that reads a positive value n and then calculates and displays the nth number in the Fibonacci sequence. The program should force reentry if the user enters 0 or negative value.

  Fib1 = 0

  Fib2 = 1

  Fib3 = Fib1 + Fib2 = 1

  Fib4 = Fib2 + Fib3 = 2

  :

  Fibn = Fib(n-2) + Fib(n-1)

Question # 2

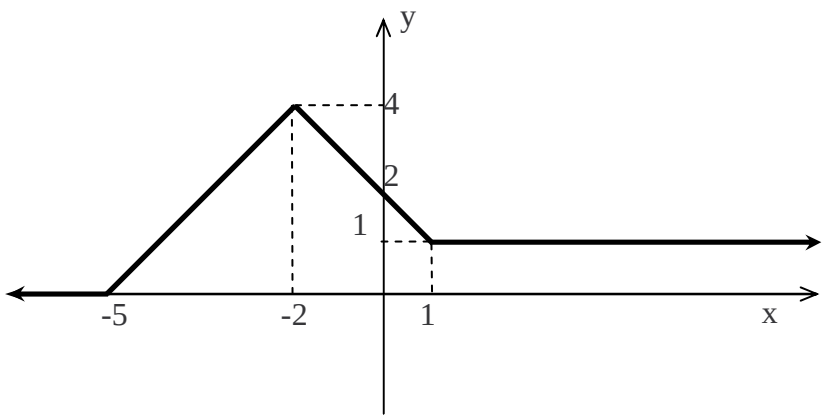
```
#include <iostream>
using namespace std;
int main(int argc, char* argv[]) {
    int n ;
    long fib_n=1,fib_n_1=1,fib_n_2=0 ;
    do{
      cout << "\nEnter a positive integer: " ;
     cin >> n ;
    } while (n<=0);
```

Question # 2

```
for (int i=2;i<=n;i++){
    fib_n = fib_n_1 + fib_n_2 ;
     fib_n_2 = fib_n_1 ;
     fib_n_1 = fib_n ;
 }
 cout << "\nFib(" << n << ")=" << fib_n ;
 return 0;
}
```

Question # 3

- Write a C++ program that produces a value regarding to the function depicted in Fig 1. The program should get an x value from user, and should print the corresponding y value.



Question # 3

```
int main(int argc, char* argv[]) {
    double x,y ;
     cout << endl << "Enter x: " ;
    cin >> x ;
    if  (x<=-5.0){
        y=0.0 ;
    }
    else if ((x>-5.0)&&(x<=-2.0)){
        y = (4.0*x+20.0)/3.0 ;
    }
    else if ((x>-2.0)&&(x<=1.0)){
            y = -x+2.0 ;
    }
    else{
        y = 1.0 ;
    }
```