Function f is defined as:

A picture containing diagram

Description automatically generated

Write a program which will:

• Accept N consequent values x, x1, x2, and x3 inserted by the user from the keyboard. N should be inserted by the user through standard input (keyboard) as well.

• Calculate the value of f for each insert

• Find the minimum and maximum value for f among all calculated values

• Find the number of the function f which are negative (less than zero), equal to zero, and positive (greater than zero)

All results should be printed on the standard output (console window) after the program has done the calculations.

(algorithm, Flowchart, test case and code attached below)

Flowchart

//Gtr = GreaterThanZero, Less = LessThanZero

start

Insert n

i=0,f=0,Gtr=0,Less=0,Eql=0

Is n=i

Insert x,x1,x2,x3

Print Min,Max, Grt, Less, Eql

End

//Eql = EqualtoZero, f = function

Yes

no

Is x1<=x<=x2?

Is x2<x<=x3?

Is x>x3?

no no

yes yes yes

f=x3

f= (x-x1)/(x2-x1)\*(x3-x1)

f= (x-x1)/(x2-x1)\*(x3-x1)

no

Is f<min?

Is f>max?

no

no

Is f>0?

Print f

yes

yes

yes

Min = f

Invalid f

Max = f

Grt=Grt+1

no

Is f=0?

Is f<0?

i=i+1

yes

yes

Eql=Eql+1

Less=Less+1

Algorithm

Insert n //number of iterations

//initializing variables

f=0, GreaterThanZero=0, LessThanZero=0, EqualtoZero=0.

i=0;

Loop for n=i times

Insert x, x1, x2, x3

If (x1<=x<=x2) //calculating f

f=(x-x1)/(x2-x1)\*(x3-x1)

else If (x2<x<=x3)

f=(x-x2)/(x3-x2)\*(x2-x1)

else if (x>3)

f=x3

else

display “Invalid value of f”

break

display value of f //printing f

if (f > Maximum) // calculating maximum and minimum value

Maximum = f

if (f< Minimum)

Minimum = f

//counting greater than, lessthan and equal

if (f > 0)

GreaterThanZero = GreaterThanZero + 1

if (f< 0)

LessThanZero = LessThanZero + 1

If (f=0)

EqualtoZero = EqualtoZero + 1

i=i+1

End loop

//print variables

Display maximum, minimum, GreaterThanZero, LessThanZero, EqualtoZero

3)Testing and Post Analysis

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Case | x | x1 | x2 | x3 | Result (f) | Description |
| 1 | 3 | 1 | 4 | 5 | 2.6666666666666665 | Correct result & Condition met for x1<=x<=x2 |
| 2 | 4 | 10 | 3 | 5 | -3.5 | Correct result & Condition met for x2<x<=x3 |
| 3 | 5 | 10 | 10 | 3 | 3 | Correct result & Condition met for x>x3 |
| 4 | 0 | 0 | 0 | 0 | NaN | If all values are 0, output produces NaN (since it can’t compute 0/0) |
| 5 | 4 | -4 | 2 | 4 | 6 | Correct result, taking one input as negative value, condition met x1<=x<=x2 |
| 6 | 10.5 | 4 | 7 | 4.5 | 4.5 | Correct Result, taking decimal values as input. Condition met for x>x3 |
| 7 | 50 | -4 | 100 | 4 | 4.153846153846154 | Correct result & Condition met for x1<=x<=x2 |
| 8 | 10000 | 20000 | 500 | 15000 | -12775.862068965518 | Using large integers, Correct result & Condition met for x2<x<=x3 |
| 9 | 5 | 3 | 6 | 3 | 0 | Testing to display 0, Correct result as x1=x3 & Condition met for x1<=x<=x2 |
| 10 | a | 3 | 4 | 5 | Invalid value of f | Since a number is not inputted it returning the result of invalid |

1. Code of the assignment also submitted on cs file

using System;

namespace Assiggnment\_1

{

class Program

{

static void Main(string[] args)

{

int n = 0; //declaring and initializing n

double x, x1, x2, x3; //declaring x,x1,x2,x3

int greatZero = 0; //declaring and intializing greaterzero,lesszero,equalzer

int lessZero = 0;

int equalZero = 0;

// intializing was not used to 0 for min and max as there are values less than and greater than 0 so the program would output 0 in those cases

double maximum = -2147483647; //declaring max & initializing it to the most minimun value possible in c# so all values are greater than it

double minimum = 2147483647; //declaring max & initializing it to the most minimun value possible in c# so all values are greater than it

double f = 0; //intializing and declaring f

Console.WriteLine("How many Iterations of N or times will the program run?"); //Taking number of iterations from user

int.TryParse(Console.ReadLine(), out n);

for (int i = 0; i < n; i++)

{

Console.WriteLine("Input the value of x"); //taking user input for x

double.TryParse(Console.ReadLine(), out x);

Console.WriteLine("Input the value of x1"); //taking user input for x1

double.TryParse(Console.ReadLine(), out x1);

Console.WriteLine("Input the value of x2"); //taking user input for x2

double.TryParse(Console.ReadLine(), out x2);

Console.WriteLine("Input the value of x3"); //taking user input for x3

double.TryParse(Console.ReadLine(), out x3);

if (x>=x1 && x<=x2) //calculation f

{

f = (x - x1) \* (x3 - x1) / (x2 - x1);

}

else if (x2<x && x<=x3)

{

f = (x - x2) \* (x2 - x1) / (x3 - x2);

}

else if (x>x3)

{

f = x3;

}

else

{

Console.WriteLine("Value of function: invalid value"); //function not invalid

continue; //since invalid value proceed to next loop

}

Console.WriteLine("Value of function: " + f); //printing f

if (f>maximum) //computing max value

{

maximum = f;

}

if (f < minimum) //computing min value

{

minimum = f;

}

if (f>0) //counting greater than, less than, equal to zero

{

greatZero = greatZero + 1;

}

else if (f<0)

{

lessZero = lessZero + 1;

}

else if (f==0)

{

equalZero = equalZero + 1;

}

}

Console.WriteLine("The maximum value of all function: " + maximum); //prininting max value

Console.WriteLine("The minimum value of all function: " + minimum); //priniting min value

Console.WriteLine("The number of times f>0 (greater) is: " + greatZero); //priniting greater value

Console.WriteLine("The number of times f<0 (lesser) is: " + lessZero); //priniting lesser value

Console.WriteLine("the number of times f=0 (equal) is: " + equalZero); //priniting equal value

}}}