**1. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10.**

#include<stdio.h>

#include<conio.h>

int main()

{

int a, b, c, c1, c2, c3;

char istriangle;

clrscr();

do

{

printf("\n Enter 3 integers which are sides of triangle\n");

scanf("%d%d%d",&a,&b,&c);

printf("\n a=%d \t b=%d \t c=%d", a, b, c);

c1 = a>=1 && a<=10;

c2= b>=1 && b<=10;

c3= c>=1 && c<=10;

if (!c1)

printf("\n The value of a=%d is not the range of permitted value",a);

if (!c2)

printf("\n The value of b=%d is not the range of permitted value",b);

if (!c3)

printf("\n The value of c=%d is not the range of permitted value",c);

} while(!(c1 && c2 && c3));

**// to check is it a triangle or not**

if ( a<b+c && b<a+c && c<a+b )

istriangle='y';

else

istriangle ='n';

if (istriangle=='y')

if ((a==b) && (b==c))

printf(" Equilateral triangle\n");

else if ((a!=b) && (a!=c) && (b!=c))

printf("Scalene triangle\n");

else

printf("Isosceles triangle\n");

else

printf("Not a triangle\n");

return 0;

}

**REQUIREMENTS**

**R1:** The system should accept 3 positive integer numbers (a, b, c) which represents 3 sides of the triangle.

**R2:** Based on the input should determine if a triangle can be formed or not.

**R3:** If therequirement R2 is satisfiedthen the system should determine the type of the triangle, which can be

• Equilateral (i.e. all the three sides are equal)

• Isosceles (i.e two sides are equal)

• Scalene (i.e all the three sides are unequal)

**R4:** Upper Limit for the size of any side is 10

**DESIGN**

From the given requirements we can draw the following conditions:

**NOTE: Upper Limit for the size of any side is 10**

**C1:** a<b+c?

**C2:** b<a+c?

**C3:** c<a+b?

**C4:** a=b?

**C5:** a=c?

**C6:** b=c?

**ALGORITHM:**

**Step 1:** Input a, b & c i.e three integer values which represent three sides of the triangle.

**Step 2: if** the inputted values a,b,c are not in the range 1 to 10 **then**

print value not in the permitted range.

**Step 3: if** (a < (b + c)) and (b < (a + c)) and (c < (a + b) **then**

**do** step 4

else

**print** not a triangle. **do** step 7.

**Step 4: if** (a=b) and(b=c) **then**

**Print** triangle formed is equilateral. **do** step 7.

**Step 5: if** (a ≠ b) and (a ≠ c) and (b ≠ c) **then**

**Print** triangle formed is scalene**. do** step 7.

**Step 6: Print** triangle formed is Isosceles.

**Step 7: stop**

**Test Case Name: Boundary Value Analysis for Triangle Problem**

**Test Data: Enter the 3 Integer Values ( a , b And c )**

**Pre-condition: 1 ≤ a ≤ 10 , 1 ≤ b ≤ 10 and 1 ≤ c ≤ 10 and a < b + c , b < a + c and c < a + b**

**Brief Description: Check whether given values form a Equilateral, Isosceles, Scalene triangl**e **or can't form a triangle**

**Triangle problem: Boundary value test cases for input data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Case Id** | **Description** | **Input Data** | | | **Expected Output** | **Actual Output** | **Status** |
| **a** | **b** | **c** |
|  | Enter the nominal value for a, b and min value for c | **5** | **5** | **1** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, b and min+ value for c | **5** | **5** | **2** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, b and c | **5** | **5** | **5** | Equilateral triangle | Equilateral triangle | Test Pass |
|  | Enter the nominal value for a, b and max- value for c | **5** | **5** | **9** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, b and max value for c | **5** | **5** | **10** | not a triangle | Not a triangle | Test Pass |
|  | Enter the nominal value for a, c and min value for b | **5** | **1** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, c and min+ value for b | **5** | **2** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, c and max- value for b | **5** | **9** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for a, c and max value for b | **5** | **10** | **5** | not a triangle | Not a triangle | Test Pass |
|  | Enter the nominal value for b, c and min value for a | **1** | **5** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for b, c and min+ value for a | **2** | **5** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for b, c and max- value for a | **9** | **5** | **5** | Isosceles triangle | Isosceles triangle | Test Pass |
|  | Enter the nominal value for b, c and max value for a | **10** | **5** | **5** | not a triangle | Not a triangle | Test Pass |