**4. 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. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.**

**#include<stdio.h>**

**int main()**

{

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

char istriangle;

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';

**// to check triangle type**

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;

}

|  |
| --- |
| **Test Case Name :Equivalence class analysis for triangle problem** |
| **Test Data : Enter the 3 Integer Value( 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 value for a Equilateral, Isosceles , Scalene triangle or**  **can't form a triangle** |

**In the problem statement, we note that four possible outputs can occur: Not a Triangle, Scalene, Isosceles and Equilateral. We can use these to identify output (range) equivalence classes as follows:**

R1= {<a,b,c>: the triangle with sides a, b, and c is equilateral}

R2= {<a,b,c>: the triangle with sides a, b, and c is isosceles}

R3= {<a,b,c>: the triangle with sides a, b, and c is scalene}

R4= {<a,b,c>: sides a, b, and c do not form a triangle}

**Weak Normal and Strong Normal Test case for Triangle Problem**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TC Id** | **Test Case Description** | **Input Data** | | | **Expected Output** | **Actual Output** | **Status** |
| **a** | **b** | **c** |
| 1 | WN1, SN1 | 5 | 5 | 5 | Equilateral Triangle | Equilateral Triangle | Test pass |
| 2 | WN2, SN2 | 2 | 2 | 3 | Isosceles Triangle | Isosceles Triangle | Test pass |
| 3 | WN3, SN3 | 3 | 4 | 5 | Scalene Triangle | Scalene Triangle | Test pass |
| 4 | WN4, SN4 | 4 | 1 | 2 | Not a Triangle | Not a Triangle | Test pass |

**Additional Weak Robust test cases for Triangle problem by considering invalid values**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TC Id** | **Test Case Description** | **Input Data** | | | **Expected Output** | **Actual Output** | **Status** |
| 1 | WR1 | -1 | 5 | 5 | Value of a is not in the range of permitted values | Value of a is not in the range of permitted values | Test pass |
| 2 | WR2 | 5 | -1 | 5 | Value of b is not in the range of permitted values | Value of b is not in the range of permitted values | Test pass |
| 3 | WR3 | 5 | 5 | -1 | Value of c is not in the range of permitted values | Value of c is not in the range of permitted values | Test pass |
| 4 | WR4 | 11 | 5 | 5 | Value of a is not in the range of permitted values | Value of a is not in the range of permitted values | Test pass |
| 5 | WR5 | 5 | 11 | 5 | Value of b is not in the range of permitted values | Value of b is not in the range of permitted values | Test pass |
| 6 | WR6 | 5 | 5 | 11 | Value of c is not in the range of permitted values | Value of c is not in the range of permitted values | Test pass |

**Additional Strong Robust Test cases for Triangle Problem by considering invalid values**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TC Id** | **Test Case Description** | **Input Data** | | | **Expected Output** | **Actual Output** | **Status** |
| **a** | **b** | **c** |
| 1 | SR1 | -1 | 5 | 5 | Value of a is not in the range of permitted values | Value of a is not in the range of permitted values | Test pass |
| 2 | SR 2 | 5 | -1 | 5 | Value of b is not in the range of permitted values | Value of b is not in the range of permitted values | Test pass |
| 3 | SR3 | 5 | 5 | -1 | Value of c is not in the range of permitted values | Value of c is not in the range of permitted values | Test pass |
| 4 | SR4 | -1 | -1 | 5 | Value of a, b is not in the range of permitted values | Value of a, b is not in the range of permitted values | Test pass |
| 5 | SR5 | 5 | -1 | -1 | Value of b, c is not in the range of permitted values | Value of b, c is not in the range of permitted values | Test pass |
| 6 | SR6 | -1 | 5 | -1 | Value of a, c is not in the range of permitted values | Value of a, c is not in the range of permitted values | Test pass |
| 7 | SR7 | -1 | -1 | -1 | Value of a, b, c is not in the range of permitted values | Value of a, b, c is not in the range of permitted values | Test pass |
| 8 | SR8 | 11 | 5 | 5 | Value of a is not in the range of permitted values | Value of a is not in the range of permitted values | Test pass |
| 9 | SR9 | 5 | 11 | 5 | Value of b is not in the range of permitted values | Value of b is not in the range of permitted values | Test pass |
| 10 | SR10 | 5 | 5 | 11 | Value of c is not in the range of permitted values | Value of c is not in the range of permitted values | Test pass |
| 11 | SR11 | 11 | 11 | 5 | Value of a, b is not in the range of permitted values | Value of a, b is not in the range of permitted values | Test pass |
| 12 | SR12 | 5 | 11 | 11 | Value of b, c is not in the range of permitted values | Value of b, c is not in the range of permitted values | Test pass |
| 13 | SR13 | 11 | 5 | 11 | Value of a, c is not in the range of permitted values | Value of a, c is not in the range of permitted values | Test pass |
| 14 | SR14 | 11 | 11 | 11 | Value of a, b, c is not in the range of permitted values | Value of a, b, c is not in the range of permitted values | Test pass |