

Results from Klee:

non-triangle.

non-triangle.

non-triangle.

triangle.

equilateral triangle .

isosceles triangle.

isosceles triangle.

KLEE: done: total instructions = 136

KLEE: done: completed paths = 8

KLEE: done: generated tests = 8

Interpretation of results:

To give greater context a missing output exists in the function. In the deepest nested if statement, no statement is presented if only a==b is satisfied. A print statement is placed here (else printf(“missed area.\n”);). This reveals the eighth test condition. This results the output sequence:

non-triangle.

non-triangle.

non-triangle.

Triangle.

Equilateral triangle .

Missed area.

Isosceles triangle.

Isosceles triangle.

Reason for output sequence:

First the run fails each of the first decision’s conditions. That is (a+b<=c) then (a+c<=b) then (b+c<=a). This results in the three “non-triangle.” Outputs.

The rest of the run only concerns the equality of the different values. The following table may be used.

|  |  |  |
| --- | --- | --- |
| a == b | a == c | b == c |
| false | false | false |
| true | true | true |
| true | false | false |
| false | true | false |
| false | false | true |

The first-row results in the “triangle.” Output, no two values are equal. The second-row results in the “equilateral triangle.” Result, all values are equal. The third through fifth results are each condition being true one at a time. The first condition being true triggers the missed area statement that should result in an isosceles. The last two correctly result in isosceles outputs.

Control flow analysis:

Decision Coverage:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a | b | c | Output | Valid |
| 1 | 1 | 5 | Non-triangle | True |
| 2 | 3 | 4 | Triangle | True |
| 2 | 2 | 2 | Equilateral | True |
| 2 | 2 | 3 | No output | False, should output isosceles. |
| 2 | 3 | 2 | Isosceles | True |

Condition Coverage:

Conditions:

|  |  |
| --- | --- |
| Dentoted by | Condition |
| C1 | a+b>c |
| C2 | a+c>b |
| C3 | b+c>a |
| C4 | a==b |
| C5 | a==c |
| C6 | b==c |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a | b | c | conditions | output | valid |
| 1 | 1 | 5 | C2,C3,C4 | Non-triangle | True |
| 1 | 5 | 1 | C1,C3,C5 | Non-triangle | True |
| 5 | 1 | 1 | C1,C2,C6 | Non-triangle | True |

Condition / Decision Coverage:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a | b | c | conditions | output | valid |
| 1 | 1 | 5 | C2,C3,C4 | Non-triangle | True |
| 1 | 5 | 1 | C1,C3,C5 | Non-triangle | True |
| 5 | 1 | 1 | C1,C2,C6 | Non-triangle | True |
| 2 | 3 | 4 | C1,C2,C3 | Triangle | True |
| 2 | 2 | 2 | C1,C2,C3,C4,C5,C6 | Equilateral | True |
| 2 | 2 | 3 | C1,C2,C3,C4 | No output | False, should output isosceles. |
| 2 | 3 | 2 | C1,C2,C3,C5 | Isosceles | True |

Multiple Condition Coverage:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a | b | c | conditions | output | valid |
| 5 | 1 | 2 | C1,C2 | Non-triangle | True |
| 5 | 1 | 1 | C1,C2,C6 | Non-triangle | True |
| 1 | 2 | 5 | C2,C3 | Non-triangle | True |
| 1 | 1 | 5 | C2,C3,C4 | Non-triangle | True |
| 1 | 5 | 2 | C1,C3 | Non-triangle | True |
| 1 | 5 | 1 | C1,C3,C5 | Non-triangle | True |
| 2 | 3 | 4 | C1,C2,C3 | Triangle | True |
| 2 | 2 | 3 | C1,C2,C3,C4 | No output | False, should output isosceles. |
| 2 | 3 | 2 | C1,C2,C3,C5 | Isosceles | True |
| 3 | 2 | 2 | C1,C2,C3,C6 | Isosceles | True |
| 2 | 2 | 2 | C1,C2,C3,C4,C5,C6 | Equilateral | True |