

## Practical No. 2

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Aim: Write a program in C/C++ to find the area of a circle, triangle, square and rectangle and perform equivalence class testing.

Theory:

- What is an equivalence class?
  - An equivalence class or equivalence partitioning is a set of test cases that tests the same thing or reveals the same bug.

In equivalence class testing, we find two types of equivalence classes :

- i) Input domain
- ii) Output domain

Input domain is formed from one valid and two invalid sequences.

The Output domain is obtained from different types of output of the problem.

- Equivalence partitioning is a type of black box testing.
- Equivalence partitioning/class testing is the process of methodically reducing the huge (infinite) set of possibilities of test cases into a much smaller, but still equally effective state.

CODE :

```
1. #include <iostream>
2. using namespace std;
3.
4. void circle(){
5.     float r;
6.     cout<<"Enter radius of circle (1-200) : ";
7.     cin>>r;
8.     if (r > 200 || r < 1)
9.         cout << "Invalid Input";
10.    else
11.        cout << "Area of circle with radius " << r << " = " << 3.14 * r * r;
12. }
13.
14. void triangle(){
15.     float h,b;
16.     cout<<"Enter height of triangle (1-200) : ";
17.     cin>>h;
18.     cout<<"Enter base of triangle (1-200) : ";
19.     cin>>b;
20.     if (h > 200 || h < 1 || b > 200 || b < 1)
21.         cout << "Invalid Input";
22.     else
23.         cout << "Area of triangle with height " << h << " and base " << b << " = " <<
24.             0.5*b*h;
25. }
26. void square(){
27.     float s;
28.     cout<<"Enter side of square (1-200) : ";
29.     cin>>s;
30.     if (s > 200 || s < 1)
31.         cout << "Invalid Input";
32.     else
33.         cout << "Area of square with side " << s << " = " << s * s;
34. }
35.
36. void rectangle(){
37.     float l,b;
38.     cout<<"Enter length of rectangle (1-200) : ";
39.     cin>>l;
40.     cout<<"Enter breadth of rectangle (1-200) : ";
41.     cin>>b;
42.
43.     if (l > 200 || l < 1 || b > 200 || b < 1)
44.         cout << "Invalid Input";
45.     else
46.         cout << "Area of rectangle with length " << l
47.             << " and breadth " << b << " = " << l * b;
48. }
49.
50.
51. int main() {
52.
53.     int choice = 0;
54.
55.     while(choice != 5){
56.         cout<<"Enter your choice : <<"\n";
57.         cout<<"1. Area of circle"<<"\n";
58.         cout<<"2. Area of triangle"<<"\n";
59.         cout<<"3. Area of square"<<"\n";
60.         cout<<"4. Area of rectangle"<<"\n";
61.         cout<<"5. Exit"<<"\n";
62.         cout<<"Choice : ";
63.     }
```

```
64.         cin>>choice;
65.
66.         if(choice == 5)
67.             break;
68.         else{
69.
70.
71.             switch (choice) {
72.                 case 1:
73.                     circle();
74.                     break;
75.                 case 2:
76.                     triangle();
77.                     break;
78.                 case 3:
79.                     square();
80.                     break;
81.                 case 4:
82.                     rectangle();
83.                     break;
84.                 default:
85.                     cout<<"Enter a valid choice.";
86.                     break;
87.
88.             }
89.             cout<<"\n";
90.             system("pause");
91.             system("cls");
92.         }
93.     }
94. }
```

## Equivalence class testing:

## 1. Triangle

## Input Domain

$$I_1 = \{ h : h \leq 0 \}$$

$$I_2 = \{ h : 1 \leq h < 200 \}$$

$$I_3 = \{ h : h \geq 200 \}$$

$$I_4 = \{ b : b \leq 0 \}$$

$$I_5 = \{ b : 1 \leq b \leq 200 \}$$

$$I_6 = \{ b : b > 200 \}$$

## Output Domain

$$O_1 : \{ \text{Triangle if } h > 0, b > 0 \}$$

$$O_2 : \{ \text{Not a Triangle if } h \leq 0, b \leq 0 \}$$

Test Case Id	h	b	Expected Output	Output
1	0	100	Invalid Input	Invalid Input
2	100	100	+0000 5000	5000
3	201	100	Invalid Input	Invalid Input
4	100	0	Invalid Input	Invalid Input
5	100	50	-5000 2500	2500
6	100	201	Invalid Input	Invalid Input

## 2. Circle :

Input Domain :

$$I_1 = \{ x : x \leq 0 \}$$

$$I_2 = \{ x : -1 \leq x \leq 200 \}$$

$$I_3 = \{ x : x > 200 \}$$

Output Domain :

$$O_1 = \{ \text{Circle if } x \geq -1 \leq x \leq 200 \}$$

$$O_2 = \{ \text{Not a circle if } x < 0 \}$$

Test Case Id	radius (x)	Expected Output	Actual Output
1	0	Invalid output	Invalid output
2	100	31400	31400
3	201	Invalid output	Invalid output

## 3. Rectangle :

Input Domain

$$I_1 : \{ l : l \leq 0 \}$$

$$I_2 : \{ l : -1 \leq l \leq 200 \}$$

$$I_3 : \{ l : l > 201 \}$$

$$I_4 = \{ I_4 : b : b \leq 0 \}$$

$$I_5 = \{ I_5 : b : 1 \leq b \leq 200 \}$$

$$I_6 = \{ I_6 : b : b \geq 201 \}$$

Output Domain:

$$O_1 = \{ \text{Rectangle if } l > 0, b > 0 \}$$

$$O_2 = \{ \text{Not a rectangle if } l \leq 0, b \leq 0 \}$$

Test Case Id	$l$	$b$	Expected Outcome	Actual Outcome
1	0	100	Invalid input	Invalid Input
2	100	100	10000	10000
3	201	100	Invalid input	Invalid Input
4	100	0	Invalid input	Invalid Input
5	100	100	10000	10000
6	100	201	Invalid Input	Invalid Input

4. Square :

Input Domain:

$$I_1 = \{ s : s \leq 0 \}$$

$$I_2 = \{ s : 1 \leq s \leq 200 \}$$

$$I_3 = \{ s : s \geq 201 \}$$

Output Domain:

$\Theta_1$

$O_1 = \{ : \text{Square, if } s > 0 \}$

$O_2 = \{ : \text{Not a Square, if } s \leq 0 \}$

Test Case Id	side(s)	Expected Output	Actual Output
1	0	Invalid Input	Invalid Input
2	100	10000	10.000
3	201	Invalid Input	Invalid Input

Conclusion:

Hence, I have executed and studied a program, written in C++, to find the area of a circle, triangle, square and rectangle and performed equivalence class testing with sample test cases.

# Triangle :

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Enter your choice : Test Case ID : 1  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 0  
Enter base of triangle (1-200) : 100  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 2  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 100  
Enter base of triangle (1-200) : 100  
Area of circle with height 100 and base 100 = 5000  
Press any key to continue . . .

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Enter your choice : Test Case ID : 3  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 201  
Enter base of triangle (1-200) : 100  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 4  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 100  
Enter base of triangle (1-200) : 0  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 5  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 100  
Enter base of triangle (1-200) : 50  
Area of circle with height 100 and base 50 = 2500  
Press any key to continue . . .

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Enter your choice : Test Case ID : 6  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 2  
Enter height of triangle (1-200) : 100  
Enter base of triangle (1-200) : 201  
Invalid Input  
Press any key to continue . . .

# Circle :

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 2\code.exe
Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 1
Enter radius of circle (1-200) : 0
Invalid Input
Press any key to continue . . .
Test Case ID : 1
```

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 2\code.exe
Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 1
Enter radius of circle (1-200) : 100
Area of circle with radius 100 = 31400
Press any key to continue . . .
Test Case ID : 2
```

```
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Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 1
Enter radius of circle (1-200) : 201
Invalid Input
Press any key to continue . . .
Test Case ID : 3
```

# Rectangle :

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Enter your choice : Test Case ID : 1  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 0  
Enter breadth of rectangle (1-200) : 100  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 2  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 100  
Enter breadth of rectangle (1-200) : 100  
Area of rectangle with length 100 and breadth 100 = 10000  
Press any key to continue . . .

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Enter your choice : Test Case ID : 3  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 201  
Enter breadth of rectangle (1-200) : 100  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 4  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 100  
Enter breadth of rectangle (1-200) : 0  
Invalid Input  
Press any key to continue . . .

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Enter your choice : Test Case ID : 5  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 100  
Enter breadth of rectangle (1-200) : 100  
Area of rectangle with length 100 and breadth 100 = 10000  
Press any key to continue . . .

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Enter your choice : Test Case ID : 6  
1. Area of circle  
2. Area of triangle  
3. Area of square  
4. Area of rectangle  
5. Exit  
Choice : 4  
Enter length of rectangle (1-200) : 100  
Enter breadth of rectangle (1-200) : 201  
Invalid Input  
Press any key to continue . . .

# Square :

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 2\code.exe - X
Test Case ID : 1
Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 3
Enter side of square (1-200) : 0
Invalid Input
Press any key to continue . . .
```

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 2\code.exe - X
Test Case ID : 2
Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 3
Enter side of square (1-200) : 100
Area of square with side 100 = 10000
Press any key to continue . . .
```

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 2\code.exe - X
Test Case ID : 3
Enter your choice :
1. Area of circle
2. Area of triangle
3. Area of square
4. Area of rectangle
5. Exit
Choice : 3
Enter side of square (1-200) : 201
Invalid Input
Press any key to continue . . .
```