

# Examples on Equivalence Class Partition-Based Testing

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# Example-1: Intersection of two straight lines

- Q. Design B-B test cases for the following program:

The program checks if 2 straight lines intersect and print their point of intersection.

Ans: The straight line may be represented as:  $y = mx + c$

Straight lines are given in the form of  $(m_1, c_1)$  and  $(m_2, c_2)$ .

Equivalent classes are as follows:

- ✓ Case 1: The lines are parallel i.e.  $m_1 = m_2$

So points are (1, 2) and (1, 5)

- ✓ Case 2: Coincident lines i.e.  $m_1 = m_2$  and  $c_1 = c_2$

And points are (2, 3) and (2, 3)

# Example-1 Contd.

- ✓ Case 3: Lines intersecting at one point i.e.  $m_1 \neq m_2$

The points may be (2, 5) and (3, 6).

So there are 3 valid equivalent classes. You may include one more valid equivalent classes

There are no boundary values here.

**So, the resultant test suite is:**

**{{(1, 2),(1, 5)}, {(2, 3),(2, 3)} {(2, 5),(3, 6)}}.**

# Example-2: Solving quadratic equations

- Q. Design B-B test cases for the following program:  
The program solves quadratic equations of the form

$$ax^2 + bx + c$$

It accepts 3 floating point values as input and gives the roots,  
e.g. The input may be (7.7, 3.3 and 4.5).

Ans: Equivalent Classes are as follows:

- I.  $b^2 = 4ac$  inputs are:  $a=2.0$ ,  $b=4.0$  and  $c=2.0$
- II.  $b^2 > 4ac$  inputs are  $a=2.0$ ,  $b=5.0$  and  $c=2.0$
- III.  $b^2 < 4ac$  inputs are  $a=2.0$ ,  $b=3.0$  and  $c=2.0$
- IV. Invalid Equation inputs are  $a=0$ ,  $b=0$  and  $c=10.0$

Write down the test cases accordingly.

# Example-3: Solving linear equations

- Q. Design B-B test cases for the following program:

The program solves linear equations in upto 10 independent variables

e.g.  $5x+6y+z=5$

$$10x+2y+5z=20$$

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# Example-3 Contd.

- Ans: Equivalent Classes are as follows:

## I. Valid Equivalent Classes

- a. Many Solution ( $\# \text{ var} < \# \text{eqns}$ )
- b. No Solution ( $\# \text{ var} > \# \text{eqns}$ )
- c. Unique Solution ( $\# \text{ var} = \# \text{eqns}$ )

## II. Invalid Equivalent Classes

- a. Too many Variables ( $\# \text{ var} > 10$ )
- b. Invalid Equation ( $\# \text{ var} = 0$ )

Write down the test cases accordingly.

# Example-4: Intersection of two circles

- Q. Design B-B test cases for the following program:

The program finds the points of intersection of 2 circles

- Ans: Equivalent Classes are as follows:

- I.  $r_1 + r_2 < \text{distance between}(x_1, y_1) \text{ and } (x_2, y_2)$  i.e. not intersecting
- II.  $r_1 + r_2 = \text{distance}$  i.e. touching at 1 point
- III.  $r_1 + r_2 > \text{distance}$  i.e. intersecting at 2 points
- IV. Distance=0 and  $r_1 = r_2$  i.e. overlapping
- V. Distance=0 and  $r_1 \neq r_2$
- VI. Invalid circles

Write down the test cases accordingly.

# Example-5: Query Book Option in LIS

Q. Design B-B test cases for the option **Query Book** using a Keyword (e.g. Author name or title).

Ans: The equivalent classes are

- Not present in catalogue (SE, not present)
- Present in catalogue (SE, present, 15 issued, not available)
- Present in catalogue (SE, present, 10 issued, 5 available)

Write down the test cases accordingly.



# References

1. Fundamentals of Software Engineering, Rajib Mall, Fifth Edition, PHI, 2018.

**Thank You**