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 (# var < #eqns)
   b. No Solution (# var > #eqns)
   c. Unique Solution (# var = #eqns)

II. Invalid Equivalent Classes

   a. Too many Variables (# var > 10)
   b. Invalid Equation (# 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. $r_1+r_2<$ distance between(x_1, y_1) and (x_2, y_2) i.e. not intersecting

II. $r_1+r_2=$ distance i.e. touching at 1 point

III. $r_1+r_2>$ 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 and the corresponding test cases are as follows:

- 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)

References

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

Thank You