Lab 8: Software Engineering (IT314)
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Q1. Previous Date Program
Equivalence Partitioning:

Tester Action and Input Data (Day, Month, Year)	Expected Outcome
Input: 15, 6, 2010 (Valid)	Previous date: 14/6/2010
Input: 1, 3, 2011 (Valid)	Previous date: 28/2/2011
Input: 32, 5, 2012 (Invalid day)	Invalid date
Input: 31, 13, 2014 (Invalid month)	Invalid date

Boundary Value Analysis:

Tester Action and Input Data (Day, Month, Year)	Expected Outcome
Input: 1, 1, 2010 (Boundary case)	Previous date: 31/12/2009
Input: 29, 2, 2012 (Leap year boundary case)	Previous date: 28/2/2012
Input: 31, 12, 2015 (Boundary case)	Previous date: 30/12/2015
Input: 1, 3, 2016 (Leap year boundary case)	Previous date: 29/2/2016

Q2:
P1: Linear Search Program
Equivalence Partitioning:

Tester Action and Input Data (Array, Value)	Expected Outcome
Input: [5, 8, 12, 3], 8	Index 1
Input: [7, 10, 15, 19], 15	Index 2

Tester Action and Input Data (Array, Value)	Expected Outcome
Input: [1, 2, 3], 4	-1 (not found)

Boundary Value Analysis:

Tester Action and Input Data (Array, Value)	Expected Outcome
Input: [], 5 (Empty array)	-1 (not found)
Input: [1, 2, 3], 1 (First element)	Index 0
Input: [1, 2, 3], 3 (Last element)	Index 2

P2: Count items program
Equivalence Partitioning:

Tester Action and Input Data (Array, Value)	Expected Outcome
Input: [5, 8, 12, 3], 8	1
Input: [7, 10, 15, 7, 7], 7	3
Input: [1, 2, 3], 4	0

Boundary Value Analysis:

Tester Action and Input Data (Array, Value)	Expected Outcome
Input: [], 5 (Empty array)	0
Input: [5, 5, 5], 5	3

P3: Binary Search Program
Equivalence Partitioning:

Tester Action and Input Data (Sorted Array, Value)	Expected Outcome
Input: [3, 6, 8, 12, 15], 8	Index 2
Input: [1, 2, 3, 4], 3	Index 2
Input: [5, 7, 9, 11], 10	-1 (not found)

Boundary Value Analysis:

Tester Action and Input Data (Sorted Array, Value)	Expected Outcome
Input: [1, 3, 5, 7], 1 (First element)	Index 0
Input: [1, 3, 5, 7], 7 (Last element)	Index 3
Input: [1, 3, 5, 7], 2 (Not present)	-1 (not found)

P4: Triangle Program(Integer Inputs)
Equivalence Partitioning:

Tester Action and Input Data (a, b, c)	Expected Outcome
Input: 3, 3, 3	Equilateral triangle
Input: 5, 5, 3	Isosceles triangle
Input: 6, 7, 8	Scalene triangle
Input: 2, 5, 10	Invalid triangle

Boundary Value Analysis:

Tester Action and Input Data (a, b, c)	Expected Outcome
Input: 1, 1, 2	Invalid triangle
Input: 3, 4, 5 (Right-angled triangle)	Scalene triangle
Input: 6, 6, 10	Isosceles triangle
Input: 2, 2, 4	Invalid triangle

P5: Prefix Program
Equivalence Partitioning:

Tester Action and Input Data (String 1, String 2)	Expected Outcome
Input: "pre", "prefix"	true
Input: "sub", "substring"	true
Input: "app", "application"	true
Input: "miss", "mismatch"	false

Boundary Value Analysis:

Tester Action and Input Data (String 1, String 2)	Expected Outcome
Input: "sub", "" (Empty string)	false
Input: "", "substring" (Empty prefix)	true
Input: "longstring", "short" (Longer prefix)	false

P6: Triangle Program (Floating-Point Inputs)

a) Equivalence Classes

The following are the identified equivalence classes for the triangle program:

1. **Equilateral Triangle**: All sides are equal (A = B = C).
2. **Isosceles Triangle**: Two sides are equal (A = B, B = C, or A = C).
3. **Scalene Triangle**: No sides are equal (A ≠ B ≠ C).
4. **Right-angled Triangle**: Follows the property A2+B2=C2A^2 + B^2 = C^2A2+B2=C2.
5. **Invalid Triangle**: The sum of two sides is less than or equal to the third.

b) Test Cases to Cover the Identified Equivalence Classes

Input (A, B, C)	Expected Outcome	Equivalence Class
3.0, 3.0, 3.0	Equilateral triangle	Equilateral Triangle
5.0, 5.0, 3.0	Isosceles triangle	Isosceles Triangle
6.0, 7.0, 8.0	Scalene triangle	Scalene Triangle
2.0, 5.0, 10.0	Invalid triangle	Invalid Triangle
3.0, 4.0, 5.0	Scalene (right-angled)	Right-angled Triangle

c) Boundary Condition for Scalene Triangle: A + B > C

For the boundary condition A + B > C, the following test cases are used to verify the boundary:

Input (A, B, C)	Expected Outcome	Boundary Condition
3.0, 4.0, 7.0	Invalid triangle	A + B = C (boundary case)
3.0, 4.0, 6.9	Scalene triangle	A + B > C (valid case)
3.0, 4.0, 7.1	Scalene triangle	A + B < C (valid case)

d) Boundary Condition for Isosceles Triangle: A = C

For the boundary condition A = C, the following test cases verify the boundary:

Input (A, B, C)	**Expected Outcome**	**Boundary Condition**
5.0, 7.0, 5.0	Isosceles triangle	A = C (valid case)
5.0, 7.0, 4.9	Scalene triangle	A ≠ C (near-boundary case)
5.0, 7.0, 5.1	Scalene triangle	A ≠ C (near-boundary case)

e) Boundary Condition for Equilateral Triangle: A = B = C

For the boundary condition A = B = C, the following test cases verify the boundary:

Input (A, B, C)	**Expected Outcome**	**Boundary Condition**
3.0, 3.0, 3.0	Equilateral triangle	A = B = C (valid case)
3.0, 3.0, 2.9	Isosceles triangle	A ≠ B ≠ C (near-boundary)
3.0, 3.0, 3.1	Isosceles triangle	A ≠ B ≠ C (near-boundary)

f) Boundary Condition for Right-Angled Triangle: $A^2 + B^2 = C^2$

For the boundary condition $A^2 + B^2 = C^2$ (right-angle), the following test cases verify the boundary:

Input (A, B, C)	**Expected Outcome**	**Boundary Condition**
3.0, 4.0, 5.0	Scalene (right-angled)	$A^2 + B^2 = C^2$ (valid case)
3.0, 4.0, 5.1	Scalene triangle	$A^2 + B^2 < C^2$ (near-boundary)
3.0, 4.0, 4.9	Scalene triangle	$A^2 + B^2 > C^2$ (near-boundary)

g) Non-Triangle Case (Invalid Triangle)

For non-triangle cases, the following test cases explore the boundary conditions where the sum of two sides is less than or equal to the third:

Input (A, B, C)	**Expected Outcome**	**Boundary Condition**
1.0, 2.0, 3.0	Invalid triangle	A + B = C (boundary case)
1.0, 2.0, 3.1	Scalene triangle	A + B < C (valid case)
1.0, 2.0, 2.9	Scalene triangle	A + B > C (valid case)

h) Non-Positive Input (Invalid Case)

For non-positive input values, the following test cases ensure invalid inputs are handled correctly:

Input (A, B, C)	**Expected Outcome**	**Boundary Condition**
0.0, 3.0, 3.0	Invalid triangle	Non-positive value
-1.0, 2.0, 3.0	Invalid triangle	Negative value
3.0, 0.0, 4.0	Invalid triangle	Non-positive value
3.0, -2.0, 4.0	Invalid triangle	Negative value