Software Engineering Lab-8

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Q1

Equivalence class:

1. month<1
2.1<=month<=12
3.month>12
4.day<1
5. 1<=day<=31
6. day>31
7.year<1900
8.1900<=year<=2015
9. year>2015

Equi class test cases	Classes covered	Expected Output class	Expected outcome
0,7,1223	1,5,7	Invalid	Error
-1,8,2007	1,5,8	Invalid	Error
8,24,2008	2,5,8	Valid	Yes
8,8,1989	2,5,8	Valid	Yes
78,35,2009	3,6,8	Invalid	Error
9,-5,2105	2,4,9	Invalid	Error
34,-1,5600	3,4,9	Invalid	Error

Boundary value	Classes	Expected Output Class	Expected outcome
1,1,1900	2,5,8	Valid	Yes
2,1,1901	2,5,8	Valid	Yes
13,0,1900	3,4,8	Invalid	Error
1,0,1900	2,4,8	Invalid	Error
0,31,1899	1,5,7	Invalid	Error
1,32,1899	2,5,7	Invalid	Error
2,1,2015	2,5,8	Valid	Yes
1,30,2015	2,5,8	Valid	Yes
1,32,2015	2,6,8	Invalid	Error
13,31,2015	3,5,8	Invalid	Error
1,31,2016	2,5,9	Invalid	Error
2,6,2016	2,5,9	Invalid	Error

Q2

P1

Equivalence class

1. Non-empty array
2. Empty array
3. Element Present in array
4. Element Not present in array

Equivalence class test cases	Classes	Expected Output Class	Expected outcome
Array =(1,2,3,4,5), el=3	1,3	Valid	Index :2
Array=(1,2,3,4,5) el=6	1,4	Invalid	-1
Empty array	2	Invalid	-1

el=3			
Empty array el=9	2	Invalid	-1
Array=(5,5,5,5) el=5	1,3	Valid	0(First occurrence)

Boundary value	**Classes**	**Expected Output Class**	**Expected outcome**
Array=(1,2,3,4,5) el=1	1,3	Valid	0
Array=(5,6,7,7) el=7	1,3	Valid	2
Array=(1,2) el=0	1,4	Invalid	-1
Empty array el=7	2	Invalid	-1
Array=(1,2,3,5,3,6,3) el=3	1,3	Valid	2
Array=(5,5,5,5) el=5	1,3	Valid	0

P2

Equivalence class

1. Non-empty array
2. Empty array
3. Element present in array
4. Element not present in array

Equivalence class test cases	**Classes**	**Expected outcome**
Array=(1,2,3,4,5) el=3	1,3	1
Array=(1,2,3) el=5	1,4	0
Empty array el=3	2,	-1
Array=(1,2,2,2) el=2	1,3	3

Boundary value	**Classes**	**Expected outcome**
Array=(1,2,3,4,5) el=1	1,3	1
Empty array el=0	2	0
Array=(1,2,3) el=0	1,4	0
Array=(10,10,10) el=10	1,3	3
Array=(-1,0,1) el=-1	1,3	1

P3

Binary search

Equivalence class

1. Non-empty array
2 Empty array
3 Element Present in array
4. Element Not present in array

Equivalence class test cases	**Classes**	**Expected Output Class**	**Expected outcome**
Array =(1,2,3,4,5), el=3	1,3	Valid	Index :2
Array=(1,2,3,4,5) el=6	1,4	Invalid	-1
Empty array el=4	2	Invalid	-1
Empty array el=6	2	Invalid	-1
Array=(5,5,5,5,6) el=5	1,3	Valid	0(First occurrence)
Array=(2,3,4,3,36,3) el=3	1,3	Valid	1

Boundary value	**Classes**	**Expected Output Class**	**Expected outcome**
Array=(1,2,3,4,5) el=1	1,3	Valid	0
Array=(5,6,7,7) el=7	1,3	Valid	2
Array=(1,2) el=0	1,4	Invalid	-1
Empty array el=7	2	Invalid	-1
Array=(1,2,3,5,3,6,3) el=3	1,3	Valid	2

Array=(5,5,5,6) el=5	1,3	Valid	0
Array=(5,5,5,6) el=6	1,3	Valid	3

P4

Triangle

Equivalence class

- **Class 1:** All sides are equal, forming an **equilateral triangle**.
- **Class 2:** Exactly two sides are equal, forming an **isosceles triangle**.
- **Class 3:** All sides are different, forming a **scalene triangle**.
- **Class 4:** One or more of the sides is negative or zero.
- **Class 5:** The sum of the lengths of any two sides is less than or equal to the third side, which is invalid according to the triangle inequality theorem.

Equi valence test cases	**Expected Output Class**	**Expected outcome**
(5, 5, 5)	Equilateral triangle (all sides equal)	EQUILATERAL
(5, 5, 3)	Isosceles triangle (two sides equal)	ISOSCELES
(6, 5, 5)	Isosceles triangle	ISOSCELES
(4, 5, 6)	Scalene triangle	SCALENE
(-1, 5, 6)	Invalid triangle (negative side length)	INVALID

(0, 5, 5)	Invalid triangle (zero side length)	INVALID

P5

Equivalence class

Valid prefix (s1 is a prefix of s2)

- Examples: `s1 = "abc"`, `s2 = "abcdef"`; `s1 = "a"`, `s2 = "abc"`
- Expected Output: `true`

Invalid prefix (s1 is not a prefix of s2)

- Examples: s1 = "abc", s2 = "abxdef"; s1 = "x", s2 = "abc"
- Expected Output: false

s1 longer than s2 (s1 cannot be a prefix of s2)

- Examples: s1 = "abcdef", s2 = "abc"; s1 = "longstring", s2 = "short"
- Expected Output: false

s1 is an empty string

- Examples: s1 = "", s2 = "abc"; s1 = "", s2 = "xyz"
- Expected Output: true (an empty string is considered a valid prefix of any string)

Equivalence test cases	Valid/Invalid	Equivalence class covered
("abc", "abcdef")	Valid	Valid prefix (s1 is a prefix of s2)
("a", "abc")	Valid	Valid prefix (s1 is a prefix of s2)
("abc", "abxdef")	Invalid	Invalid prefix (s1 is not a prefix of s2)
("x", "abc")	Invalid	Invalid prefix (s1 is not a prefix of s2)

("abcdef", "abc")	Invalid	s1 longer than s2 (s1 cannot be a prefix of s2)
("longstring", "short")	Invalid	s1 longer than s2 (s1 cannot be a prefix of s2)
("", "abc")	Invalid	s1 is an empty string

P6

a) Identify the Equivalence Classes

1. **Valid Triangles:**
   - Equilateral Triangle: A=B=CA = B = CA=B=C
   - Isosceles Triangle: Two sides equal (e.g., A=BA = BA=B, A=CA = CA=C, or B=CB = CB=C)
   - Scalene Triangle: All sides different (e.g., A≠B≠CA \neq B \neq CA=B=C)
   - Right Triangle: A2+B2=C2A^2 + B^2 = C^2A2+B2=C2 (one right angle)
2. **Invalid Triangles:**
   - Non-triangle: A+B≤CA + B \leq CA+B≤C or any side is non-positive
   - Non-positive values: A≤0A \leq 0A≤0, B≤0B \leq 0B≤0, or C≤0C \leq 0C≤0

b) Identify Test Cases to Cover Equivalence Classes

Test Case	Input Values (A, B, C)	Expected Output	Equivalence Class
1	(3.0, 3.0, 3.0)	"Equilateral"	Equilateral Triangle
2	(3.0, 3.0, 2.0)	"Isosceles"	Isosceles Triangle
3	(3.0, 4.0, 5.0)	"Scalene"	Scalene Triangle
4	(5.0, 12.0, 13.0)	"Right angled"	Right Triangle
5	(1.0, 2.0, 3.0)	"Not a triangle"	Non-triangle
6	(0.0, 1.0, 2.0)	"Not a triangle"	Non-positive input

7	(-1.0, 1.0, 1.0)	"Not a triangle"	Non-positive input

c) Boundary Conditions for Scalene Triangle (A + B > C)

Test Case	Input Values (A, B, C)	Expected Output
8	(3.0, 4.0, 6.0)	"Scalene"
9	(3.0, 4.0, 7.0)	"Not a triangle"
10	(3.0, 4.0, 5.0)	"Scalene"

d) Boundary Condition for Isosceles Triangle (A = C)

Test Case	Input Values (A, B, C)	Expected Output
11	(5.0, 5.0, 3.0)	"Isosceles"
12	(3.0, 5.0, 3.0)	"Isosceles"
13	(3.0, 4.0, 3.0)	"Isosceles"

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

Test Case	Input Values (A, B, C)	Expected Output
14	(4.0, 4.0, 4.0)	"Equilateral"
15	(1.0, 1.0, 1.0)	"Equilateral"

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

Test Case	Input Values (A, B, C)	Expected Output

16	(3.0, 4.0, 5.0)	"Right angled"
17	(5.0, 12.0, 13.0)	"Right angled"
18	(8.0, 15.0, 17.0)	"Right angled"
19	(1.0, 1.0, 1.414)	"Right angled"

g) Test Cases for Non-Triangle

Test Case	Input Values (A, B, C)	Expected Output
20	(1.0, 2.0, 3.0)	"Not a triangle"
21	(1.0, 1.0, 2.0)	"Not a triangle"
22	(3.0, 3.0, 7.0)	"Not a triangle"

h) Test Cases for Non-Positive Input

Test Case	Input Values (A, B, C)	Expected Output
23	(0.0, 1.0, 1.0)	"Not a triangle"
24	(-1.0, 1.0, 1.0)	"Not a triangle"
25	(1.0, -1.0, 1.0)	"Not a triangle"
26	(1.0, 1.0, -1.0)	"Not a triangle"