Lab : 1

Generate testcases using equivalence class testing technique to calculate standard deduction on standard income. The standard deduction is higher for tax payers who are 65 or older or blind. Use the method given below to calculate tax : The first factor that determines standard ~~deviation~~ deduction is the filing status. The basic standard deduction for various filing status are :

Single Rs 4750

Married, filing a joint return Rs 9500

Married, filing a separate return Rs 7000

If a married couple is filing separate returns and one spouse is not taking standard deduction, the other spouse also is not eligible for standard deduction. An additional Rs 1000 is allowed as standard deduction, if either the filer is 65 yrs or the spouse is 65 yrs or older. An additional Rs 1000 is allowed as standard deduction, if either the filer is blind or the spouse is blind.

* Equivalence Classes :

C1 = Status { Single || Married }

C2 = Age {>=65 || <65}

C3 = Eye sight {Blind || Not blind }

C4 = Class { Separate || Joint }

Test Case Id	Summary	Dependency	Pre-condition	Post-Condition	I/P	Execution Step	Expected Output	O/P	Status
TC-1	Single is filing	-	-	Tax value	9000	Enter Status, eyesight, Class, Age.	4250		
TC-2	Age <65, Single	-	-	Tax value	9000	Enter Status, eyesight, class, Age	4250		
TC-3	Blind	TC-2 Yes	Age<65, Single	Tax value	9000	Enter Status, eyesight, age	3250		

Test Case Id	Summary	Dependency	Pre-condition	Post-condition	I/P	Execution Step	Expected O/P	O/P Status
TC-4	Separate return, married	-	-	Tax amount	9000	Input age, eyesight, status, class	2000	

(OR)

TC-5	Status neither single nor married.	-	-	Tax amo Status is invalid.	9000	Input age, eyesight, status, class	Error Nessage	
TC-6	Age is 0	-	-	Age is not valid	9000	Input age, eyesight,	Error Nessage	

TC-7	Eyesigh is neither Blind nor Not blind	-	-	Eyesight is not valid	9000	Input age, Eyesight, Status, class	Error Message
TC-8	Class is neither Separate nor joint	-	-	Class is not valid	9000	Input age, eyesight, status, class	Error Message

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(SN) TC-9	Status is single, age is >65	-	-	Tax amount	10000	Input age, eyesight, Status, class	4250

TC-10	Status is Single, Person is filer blind	-	-	Tax amount	10000	Input age, eyesight, status, class	4250
TC-11	Status is ~~Single~~, married, class is separate	-	-	Tax amount	10000	Input age, eyesight, status, class	3000
TC-12	Age is >65, filer is blind	-	-	Tax amount	10000	Input age, eyesight, status, class	3250

TC-13	Age < 65, filing a separate return	-	-	Tax amount	10000	Input age, eyesight, status, class	3000
TC-14	Filer is blind, filing a joint return	-	-	Tax amount	10000	Input age, eyesight, Status, class	500

(SR)

TC-15	Status is neither single, nor Married	-	-	Status is invalid	10000	Input age, eyesight, Status, class	Error Message
TC-16	Age is 0	-	-	Age is invalid	10000	Input age, eyesight, Status, class	Error message

TC-17	Eye sigh is neither blind nor not blind.	-	-	Eyesight is invalid	10000	Input age, eyesight, Status, class	Error message
TC-18	Class is neither separate nore joint	-	-	Class is invalid	10000	Input age, eyesight, Status, class	Error message.
TC-19	Status is invalid, age is 0	-	-	Status is invalid, age is invalid	10000	Input age, eyesight, status, class	Error message.
TC-20	Status is invalid, Eye sight is invalid	-	-	Status is invalid, Eye sight is invalid	10000	Input age, eyesight, Status, class	Error message.

TC-21	Status is invalid, Class is invalid	-	-	Status is invalid, class is invalid	10000	Input age, eyesight, status, class	Error message
TC-22	Age is 0, Eye sight is invalid	-	-	Status is invalid, Eye sight is invalid	10000	Input age, eyesight, Status, class	Error message
TC-23	Age is 0, Class is invalid	-	-	Age is invalid, class is invalid	10000	Input age, eyesight, status, class	Error message
TC-24	Eyesight is invalid, Class is invalid	-	-	Eyesight is invalid, class is invalid	10000	Input age, eyesight, Status, class	Error message

TC-25	Status is neither single nor married. Age is 0, Eyesight is neither blind nor not blind	-	-	Status is invalid, Age is invalid. Eyesight is invalid	10000	Input age, eyesight, status, class	Error message
TC-26	Status is neither single. nor married. Age is 0, Class is neither separate nor joint	-	-	Status is invalid, Age is invalid, Class is invalid	10000	Input age. eyesight, status, class	Error message
TC-27	Age is 0, Eye sight is neither blind nor not blind Class is invalid	-	-	Age is invalid, Eyesight is invalid, Class is invalid	10000	Input age. eyesight, status, class	Error Message

TC-28	Status is neither single nor married. age is 0, eyesight is neither blind nor not blind, Class is neither separate nor joint.	-	-	Age is invalid, Status is invalid, Eyesight is invalid, Class is invalid	10000	Input age, eyesight, status, class	Error message

Lab-2

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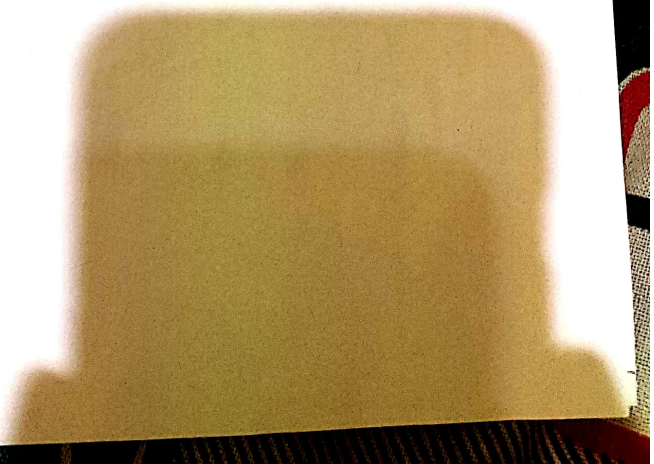
The commission problem includes a sales person. The sales person sold rifle locks, stocks and barrels made by a gunsmith, cost of locks is $45, stocks is $30 and barrels is $25. The sales person had to sell at least one complete rifle per month and the production limits were such that the most the sales person could sell in a month was 70 locks, 80 stocks, 90 barrels. After each town visit, the sales person sends a telegram to the gunsmith with no. of locks, stocks and barrels sold in each town. At the end of the month, the sales person sends a very short telegram, showing 1 lock sold. When the gunsmith got this message, he knew that the sale for the month were complete and complete the salesperson's commission. It is a follows:

On sales upto (and including) $1000 = 10%;
On sales upto (and including) $1800 = 15%;
On sales in excess of $1800 = 20%



Test case Id	Summary	Dependency	Pre-condition	Post-condition	Input	Execution step	Expected O/P	Actual O/P	status
(WV)									
TC-1	locks sold are at boundary, stocks and barrel are valid	–	–	Commission amount	L = 1, S = 79, B = 89	Input the no. of locks, stocks, barrels sold	708	708	Pass
TC-2	stocks sold are at boundary, locks and barrels are valid	–	–	Commission amount	L = 20, S = 1 B = 20	Input the no. of locks, stocks barrels sold	63	63	Pass
TC-3	Barrels are at boundary, locks and stocks are valid.	–	–	Commission amount	L = 20 S = 20 B = 1	Input the no. of locks, stock, barrels sold	152.5	152.5	Pass
(SN)									
TC-4	locks is at boundary, stocks is at boundary, barrels are valid	–	–	Commission amount	L = 1 S = 1 B = 20	Input the no. of locks, stocks and barrels sold	57.5	57.5	Pass

TC-5	Locks is at boundary, stocks is valid, barrels is at boundary	–	–	Commission amount	L=1 S=20 B=1	Input the no. of locks, stocks & barrels sold	67	67	Pass
TC-6	Locks is valid stocks and locks are at boundary	–	–	Commission amount	L=20 S=1 B=1	Input the no. of locks, stocks & barrel sold	95.5	95.5	Pass
TC-7	Locks, stocks and barrels are at boundary	–	–	Commission amount	L=1 S=1 B=1	Input the no. of locks, stocks and barrels sold	10	10	Pass
(WR)									
TC-8	Locks are invalid, stocks and barrels are valid	–	–	Commission amount	L=0 S=1 B=20	Input the no. of locks, stocks and barrels sold	53	53	Pass
TC-9	Lock and barrel are valid, stocks is invalid (locks is at boundary)	–	–	Commission amount	L=1 S=0 B=20	Input the no. of locks, stocks and barrels sold	54.5	54.5	Pass

TC-10	Locks is valid Stocks is at boundary, Barrels is invalid	–	–	Commision amount	L = 20 S = 0 B = 1	Input the no. of locks, stocks and barrel sold	92.5	92.5	Pass
(SR)									
TC-11	Locks is invalid and stocks is invalid, barrels is at boundary	–	–	Commision amount	L = 0 S = 0 B = 1	Input the no. of locks, stocks and barrels sold	2.5	2.5	Pass
TC-12	Locks and barrel are invalid and stock is at boundary	–	–	Commision amount	L = 0 S = 1 B = 0	Input the no. of locks, stocks and barrels sold	3	3	Pass
TC-13	Locks ~~are at boundary~~, stocks and barrels are invalid	–	–	Commision amount	L = 0 S = 0 B = 0	Input the no. of locks, stocks and barrels sold	0	0	Pass
TC-14	Locks are at boundary, stocks and barrels are invalid	–	–	Commision amount	L = 1 S = 0 B = 0	Input the no. of locks, stocks and barrel sold	4.5	4.5	Pass

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Commission Problem - Equivalence Class testing

Test case	Summary	Dependancy	Pre-condition	Post-condition	Input	Execution step	Expected o/p	Actual o/p	status
(SN, UN)									
TC-1	Locks, stocks and barrels are valid	—	—	Commission amount	L=35, S=40, B=45,	Input locks, stocks, barrels	3900 commission =640	3900 commission =640	Pass
(UR)									
TC-2	Locks, stocks and barrels are valid	—	—	Commission amount	L=35 S=40 B=45	Input locks, stocks, barrels	3900 commission =640	3900 commission =640	Pass
TC-3	Locks is invalid, stocks & barrels are valid	—	—	Locks is invalid	L=0 S=40 B=45	Input locks, stocks, barrels	Invalid locks	Invalid locks	Pass
TC-4	Locks is invalid, stocks & barrels are valid	—	—	Locks is invalid	L=71 S=40 B=45	Input locks, stocks, barrels	Invalid locks	Invalid locks	Pass

—	—	stocks is invalid	L=35, S=0, B=45	Input locks, stocks, barrels	Invalid stocks	Invalid stocks	Pass
—	—	stocks is invalid	L=35, S=81, B=45	Input locks, stocks, barrels	Invalid stocks	Invalid stocks	Pass
—	—	Barrels is invalid	L=35, S=40, B=0	Input locks, stocks, barrels	Invalid barrels	Invalid Barrels	Pass
—	—	locks out of range	L=-1 S=40 B=45	Input locks, stocks, barrels	Value of locks not in range	Locks not in range	Pass
—	—	stocks out of range	L=35 S=-1 B=45	Input locks, stock, barrels	Value of stock not in range	stocks not in range	Pass
—	—	Barrels out of range	L=35 S=40 B=-1	Input locks, stocks, barrels	Value of barrels not in range	Barrels not in range	Pass

TC-11	Locks and stocks out of range, barrels is valid	—	—	locks and stocks out of of range	S = -1, L = -1, B = 45	Input locks, stocks, barrels	Invalid locks & stocks	locks, stocks invalid	Pass
TC-12	Locks and barrels are not in range, stocks is valid	—	—	locks and barrels not in range	L = -1 S = 40 B = -1	Input locks, stocks, barrels	Value of locks barrels out of range	locks, barrels out of range	Pass
TC-13	Stocks and barrels are not in range, locks are valid	—	—	stocks, barrels out of range	L = 35 S = -1 B = -1	Input, locks, stocks, barrels	Value of stocks, barrels out of range	stocks, barrels out of range	Pass
TC-14	locks, stocks & barrels are not in range	—	—	locks, stocks, barrels out of range	L = -1 S = -1 B = -1	Input locks, stocks, barrels	Value of locks, stocks, barrels out of range	locks, stocks, barrels, out of range	Pass

Commission Problem - Decision

Conditions	Condition Entries (Rules)					
C1: $1 \leq locks \leq 70$?	F	T	T	T	T	T
C2: $1 \leq stocks \leq 80$?	--	F	T	T	T	T
C3: $1 \leq barrels \leq 90$?	--	--	F	T	T	T
C4: sales > 1800 ?	--	--	--	T	F	F
C5: sales > 1000 ?	--	--	--	--	T	F
C6: sales ≤ 1000 ?	--	--	--	--	--	T
Actions	**Action Entries**					
a1: com1 = 0.10 * sales						X
a2: com2 = com1 + 0.15 * (sales - 1000)					X	
a3: com3 = com2 + 0.20 * (sales - 1800)				X		
a4: com4 = Out of range	X	X	X			

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Lab : 3

Q. "Next date" is a function consisting of 3 variables likes: month, date and year. It returns the date of next day as output. It reads current date as input date

The conditions are :

C1 : $1 \leq$ month ≤ 12

C2 : $1 \leq$ day ≤ 31

C3 : $1900 \leq$ year ≤ 2025

If any one condition out of C1, C2 or C3 fails, then this function produces an output "value of month not in the range 1... 12".

Derive test cases by equivalence class testing and derive the decision table.

Pre-condition : Month 1 to 12 , Day 1 to 31 and year 1812 to 2013.

Valid cases : $M1 = \{ month ; 1 \leq month \leq 12 \}$

$D1 = \{ day ; 1 \leq day \leq 31 \}$

$Y1 = \{ year ; 1812 \leq year \leq 2013 \}$

Invalid cases : $M2 = \{ month : month < 1 \}$

$M3 = \{ month : month > 12 \}$

$MD2 = \{ day : day < 1 \}$

$D3 = \{ day : day > 31 \}$

$Y2 = \{ year : year < 1812 \}$

$Y3 = \{ year : year > 2013 \}$

Test Case Id	Summary	Pre-condition	Post-condition	Input	Execution step	Expected o/p	Actual o/p	status
(normal)								
TC-1	Enter the M3, D1 and Y1 valid cases	—	Determine next day	M1=6 D1=15 Y1=1912	Input M1, D1 and Y1	Date of next day	Date of next day	Pass
(WR)								
TC-2	Enter the M1, D1 and Y1 cases	—	Determine next date	M1 = 6 D1=15 Y1=1912	Input M1 D1 & Y1	Date of next day 6.16.1912	6.16.1912	Pass
TC-3	Enter M2, D1 & Y1 cases	—	Determine date of next day.	M1 = -1 D1 =15 Y1=1912	Input M2, D1 and Y1	Display error message	Error	Pass
TC-4	Enter M3, D1 and Y1 cases	—	Month not in range	M3 =13, D1 =15, Y1=1912	Input M3, D1 and Y1	Display error message	Error	Pass
TC-5	Enter the M1, D3 and Y1 cases	—	Day not in range	M1=6 D3 = 32, Y1 =1912	Input M1, D3 and Y1	Display error message	Error	Pass
TC-6	Enter the M1, D2, Y1 cases	—	Day not in range	M1 = 6 D2 =-1, Y1 =1912	Input M1, D2 and Y1.	Display error message	Error	Pass

TC-7	Enter the M1, D1 and Y2 cases	–	Year not in range	M1 = 6 D1 = 15 Y2 = 1811	Input M1, D1 & Y2	Display error message	Error	Pass	
TC-8	Enter the M1, D1 and Y3 cases	–	Year not in range	M1 = 6 D1 = 15 Y3 = 2014	Input M1, D1 & Y3	Display error message	Error	Pass	
(SR) TC-9	Enter M2, D2 and Y1 cases	–	Day not in range	M1 = 6 D1 = -1 Y1 = 1912	Input M1, D2 & Y1	Display error message	Error	Pass	
TC-10	Enter M2, D1 and Y1 cases	–	Month not in range	M2 = -1, D1 = 15, Y1 = 1912	Input M2, D1 & Y1	Display error message	Error	Pass	
TC-11	Enter M1, D1 & Y2 cases	–	Year not in range	M1 = 6 D1 = 15 Y2 = 1811	Input M1, D1 & Y2	Display error message	Error	Pass	
TC-12	Enter M2, D2, Y1 cases	–	Month, day not in range	M2 = -1 D2 = -1 Y1 = 1912	Input M2, D2 and Y1	Display error message	Error	Pass	
TC-13	Enter M1, D2, Y2 cases	–	Day, year not in range	M1 = 6 D2 = -1 Y1 = 1811	Input M1, D2, Y1	Display error message	Error	Pass	
TC-14	Enter M2, D1 & Y1 cases	–	Month, year not in range	M2 = -1 D1 = 15 Y1 = 1811	Input M2, D1 & Y1	Display error message	Error	Pass	

TC-15	Enter M2, D2 and Y2 cases	—	Month, day yeand not in range	M2 = -1 D2 = -1 Y2 = 1811	Input M2, D2, Y2	Display error message	Error	Pass

Terminologies :-

M1 = {month : 1.. 12 | day (month) = 30}

M2 = {month: 1.. 12 | days (month) = 31 ∧ month ≠ 12}

M3 = {month: {12}}

M4 = {month: {2}}

D1 = {day : 1.. 27}

D2 = {day : {28}}

D3 = {day : {29}}

D4 = {day : {30}}

D5 = {day : {31}}

Y1 = {year : 1812.. 2012 | leap-year (year)}

Y2 = {year : 1812.. 2012 | common-year (year)}

11 M3	12 M3	13 M3	14 M3	15 M3	16 M4	17 M4	18 M4	19 M4	20 M4	21 M4	22 M4
D1	D2	D3	D4	D5	D1	D2	D2	D3	D3	D4	D5
–	–	–	–	–	–	Y1	Y2	Y1	Y2	–	–
									X	X	X
X	X	X	X		X	X					
				X							
							X	X			
							X	X			
						X					
						X					

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Next - Date Problem Boundary Value Analysis

Test case Id	Summary	Dependency	Pre-condition	Post condition	Input	Execution step	Expected o/p	Actual o/p	Status
BC-1	Year is at boundary, M, D are valid	—	—	Next Date is determined	M = 6, D = 15, Y = 1900	Input M, D, Y	16 June 1900	year out of range	fail
BC-2	Year is boundary +1, M and D are valid	—	—	Next Date is determined	M = 6 D = 15 Y = 1901	Input M, D, Y	16 June 1901	year out of range	fail
BC-3	Year, month and day are valid	—	—	Next Date is determined	M = 6, D = 15, Y = 1962	Input M, D, Y	16 June 1962	16 June 1962	Pass
BC-4	Year is boundary -1, day and month are valid	—	—	Next Date determined	M = 6, D = 15 Y = 2024	Input M, D, Y	16 June 2024	Year not in range	Fail
BC-5	Year is at boundary, day and month are valid	—	—	Next Date determined	M = 6 D = 15, Y = 2025	Input M, D, Y	16 June 2025	Year not in range	fail
BC-6	Day is at boundary, month and year are valid	—	—	Next Date determine	M = 6 D = 1 Y = 1962	Input M, D, Y	2 June, 1962	2 June 1962	Pass

TC-7	Day is boundary +1, month and year are valid	–	–	Next Date determined	M=6 D=2 Y=1962	Input M, D, Y	1 June, 1962	1 June, 1962	Pass
TC-8	M is at valid, D is boundary -1	–	–	Next Date determined	M=6 D=30 Y=1962	Input M, D, Y	1 July 1962	1 July 1962	Pass
TC-9	M is valid, D is at boundary	–	–	Invalid date	M=6 D=31 Y=1962	Input M, D, Y	Invalid Date	Invalid Date	fail
TC-10	M is at boundary D is valid	–	–	Next date is determined	M=1 D=15 Y=1962	Input M, D, Y	16 January 1962	16 January 1962	Pass
TC-11	M is boundary+1, date is valid	–	–	Next date is determined	M=2 D=15, Y=1962	Input M, D, Y	16 Feb, 1962	16 Feb 1962	Pass
TC-12	M is boundary -1, Date is valid	–	–	Next date is determined	M=11 D=15 Y=1962	Input M, D, Y	16 Nov, 1962		
TC-13	M is at boundary, Date is valid	–	–	Next date is determined	M=12, D=15, Y=1962	Input M, D, Y	16 Dec 1962		

Lab - 4

The triangle problem accepts 3 integers a, b, c. These are taken to be the sides of a triangle. The output of the program is the type of triangle determined by 3 sides.

The 3 integers a, b, c must satisfy the following conditions:-

C1: $1 \leq a \leq 200$
C2: $1 \leq b \leq 200$
C3: $1 \leq c \leq 200$
C4: $a < b+c$
C5: $b < a+c$
C6: $c < a+b$

If any input values fail to meet, any of the conditions C1, C2, C3, the program notes this with an output message "Value of b is not in the range of the permitted values".

If the values a, b, c satisfies C1, C2, C3 one of the 4 mutually exclusive outputs are given.

O1: If all 3 sides are equal, the program output is equilateral

O2: If exactly one pair of sides are equal, the program output is isosceles

O3: If no sides are equal, the output is scalene

If any of the conditions is not met, the program output is "Not a triangle".

Test Case Id	Summary	Dependency	Pre-condition	Post condition	Input	Execution step	Expected o/p	Actual o/p	Status
TC-1	a is in range, b,c are in range	–	–	Type of triangle is determined	a=60 b=60 c=60	Input a,b,c	Equilateral	Value of a,b,c not in range	fail
TC-2	a,b,c are in range	–	–	Type of triangle is determined	a=98 b=100 c=102	Input a,b,c	Scalene	Values of a,b,c not in range	fail
TC-3	a is not in range, b,c are in range	–	–	Value of a is not in the range of permitted values	a=0 b=50 C=50	Input a,b,C	Value of a not in range	Value of a,b,c not in range	fail
TC-4	b is not in range, a,c are in range	–	–	Value of b is not in range of permitted values	a=50 b=20 c=50	Input a,b,c	Value of b is not in range	Value of a,b,c not in range	fail
TC-5	c is not in range, a and b are in range	–	–	value of c is not in range of permitted values	a=50 b=20 C=500	Input a,b,c	Not a triangle	Not a triangle	Pass
TC-6	a,b,c are invalid, not in range	–	–	It is not a triangle	a=1 b=8 C=10	Input a,b,C	Not a triangle	Not a triangle	Pass
TC-7	a,b are not in range c is in range	–	–	Not a triangle	a=0 b=0 c=50	Input a,b,C	a,b, not in range	a,b,c not in range	fail

TC-8	a,c are not in range, b is in range	–	–	a, c not in range	a = 0 c = 0 b = 20	Input a, b, c	a, c not in range	a, b, c not in range	fail
TC-9	b, c are not in range, a is in range	–	–	b, c not in range	a = 25 b = 0 c = 0	Input a, b, c	b, c not in range	a, b, c not in range	fail
TC-10	a is in range, b is in range, c is in range	–	–	type of triangle determined	a = 10 b = 10 c = 20	Input a, b, c	Isosceles triangle	c is not in range	fail
TC-11	b is in range, a and c are in range	–	–	type of triangle determined	a = 10 b = 20 c = 30	Input a, b, c	Scalene triangle	b, c not in range	fail
TC-12	c is in triangle a & b are in range	–	–	type of triangle is determined	a = 50 b = 50 c = 50	Input a, b, c	Equilateral triangle	a, b, c not in range	fail

Boundary Value Analysis

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Test case Id	Summary	Dependency	Pre condition	Post condition	Input	Execution step	Expected o/p	Actual o/p	Status
TC-1	a is a boundary, b,c are valid	—	—	Type of triangle determined	a=1, b=2 c=3	Input a,b,c	Not a triangle	Not a triangle	Pass
TC-2	b is at boundary b,c are valid	—	—	Type of triangle is determined	a=2 a=1 c=3	Input a,b,c	Not a triangle	Not a triangle	Pass
TC-3	a,c is at boundary, a, b are valid	—	—	Type of triangle is determined	a=50 b=20 c=200	Input a,b,c	Not a triangle	Not a triangle	fail
TC-4	a is out of range, b is at boundary, c is in range	—	—	a is not is range	a=0 b=1 c=2	Input a,b,c	a not in range	a not in range	Pass
TC-5	a is in range b is at boundary c is out of range	—	—	c is not in range	a=2 b=1 c=0	Input a,b,c	c not in range	c not in range	Pass

TC-6	a is out of range, b is in range, c is at boundary	–	–	a is not in range	a=0 b=2 c=1	Input a,b,c	a not in range	a not in range	Pass
TC-7	a is at boundary, b is in range c is out of range	–	–	c is not in range	a=200 b=199 c=201	Input a,b,c	c not in range	a,b,c not in range	fail
TC-8	a is in range, b is out of range, c is at boundary	–	–	b is not in range	a=199 b=201 c=200	Input a,b,c	b not in range	a,b,c not in range	fail
TC-9	a is at boundary, b is out of range, c is in range	–	–	b is not in range	a=200, b=201 c=199	Input a,b,c	b not in range	a,b,c not in range	fail

Decision Table

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C1: a+b>c or b+c>a or c+a>b	F	T	T	T	T	T	T	T	T
C2: a = b		F	F	F	F	T	T	T	T
C3: b = c		F	F	T	T	F	F	T	T
C4: c = a		F	T	F	T	F	T	F	T
a1: Not a Δ	X								
a2: Equilateral Δ									X
a3: Isosceles Δ			X	X		X			
a4: Scalene Δ		X							
a5: Not possible					X		X	X	