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① Intersection of two straight line —

we have a line $y = mx + c$ and which act as out input and we have to give input in the form of (m_1, c_1) and (m_2, c_2)

Case 1 → The given line is parallel

condition → $m_1 = m_2$

Case 2 → the given line is coincident when

condition → $m_1 = m_2$ and $c_1 = c_2$

Case 3 → Intersect points on the given line

By solving and putting the value of (m, c) in the equation, we'll get intersection point.

Input	Case 1	Case 2	Case 3
$(3,6)\ (3,5)$ $m_1 = m_2$	Parellel	Invalid	Invalid
$(5,6)\ (5,6)$ $m_1 = m_2$ $c_1 = c_2$	Invalid	Coincident	Invalid
$(3,6)\ (4,6)$ $c_1 = c_2$	Invalid	Invalid	Invalid
$(3,6)\ (2,5)$ $m_1 \neq m_2$ $c_1 \neq c_2$	Invalid	Invalid	Valid

② Design B-B testcase for the following —

$$ax^2 + bx + c$$

$b^2 - 4ac \rightarrow$ descriminat which tells how many roots a quadratic eq^n and also determises its nature.

ture are three equivalent classes —

Case - 1 $\rightarrow$ $b^2 - 4ac < 0$

In the above case no roots possible

case - 2 $\rightarrow$ $b^2 - 4ac = 0$

One real root possible

case - 3 $\rightarrow$ $b^2 - 4ac > 0$
two real roots determined by
eq$^n \rightarrow$ $\cancel{\pm b}$ $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Input	Case 1	Case 2	Case 3
$a = 2, b = 4, c = 2$ $b^2 - 4ac < 0$	Valid	Invalid	Invalid
$a = 2, b = 3, c = 10$ $b^2 < 4ac$	Valid	Invalid	Invalid
$a = 2, b = -11, c = 5$ $2x^3 - 11x + 5$ $b^2 - 4ac > 0$	Invalid	Invalid	Valid
$a = -4, b = 12, c = -9$ $-4x^2 + 12x - 9$ $b^2 - 4ac = 0$	Invalid	Valid	Invalid
$a = 1, b = -3, c = 4$ $x^2 - 3x + 4$ $b^2 - 4ac < 0$	Valid	Invalid	Invalid

(3) Solving linear equations —

Design B-B test cases for the following the program solves linear equation upto 10 Independent variable.

Equivalent classes —

1. Many Solutions ($\#var < \#eq^n$)

2. No Solutions ($\#var > \#eq^n$)

3. Unique Solution ($\#var = \#eq^n$)

Invalid equivalent classes —

1. too many variable ($\#var > 10$)

2. Invalid equation ($\#var = 0$)

No. of Var.	Equations	Result
8	9	Many Solutions
8	5	No Solution
5	5	Unique Solution
11	—	too many Solution
10	—	Invalid Equation

④ Design B-B test case for the following -

Intersection of two circles -

$$(x - x_1)^2 + (y - y_1)^2 = r_1^2 \quad \text{.... ①}$$

$$(x - x_2)^2 + (y - y_2)^2 = r_2^2 \quad \text{.... ②}$$

Equivalent classes —

1. $r_1 + r_2 < d$ ⟹ No Intersect

2. $r_1 + r_2 = d$ ⟹ Intersect at 1 point

3. $r_2 + r_1 > d$ ⟹ Intersect at 2 points

4. $d = 0$ and $r_1 = r_2$ ⟹ Overlapping

5. $d = 0$ and $r_1 \neq r_2$ ⟹ Invalid circle

Distance can be calculated as —

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Input	Case 1	Case 2	Case 3	Case 4
$x_1 = x_2$ $y_1 = y_2$ $d = 0$	Invalid	Invalid	Invalid	Valid
$r_1 + r_2 > d$	Invalid	Invalid	Valid	Invalid
$r_1 0 = r_2$	Invalid	Invalid	Invalid	Valid
$r_1 + r_2 = d$	Invalid	Valid	Invalid	Invalid
$r_1 + r_2 < d$	Valid	Invalid	Invalid	Invalid

(5) Query Book option in LIS -

keyword (Author Name, Title)

Equivalent classes —

1. Not present in catalogue.

2. Present (SE, present) 15 Issued, N/A

3. Present (SE, present) 10, Issued, 5 Av.

Input	Case 1	Case 2	Case 3
Author = NULL Title = NULL	Invalid	Invalid	Invalid
Author = Present Iss → 1<n<∞ Not present	Invalid	Valid	Invalid
Author = SE Iss and Available	Invalid	Invalid	Valid