UDAAN

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Pair of linear equation in two variable

Mathematics

Lecture - 04

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Topics

to be covered

1. Let's discuss case of no solution
2. Questions on Conditions of solvability.


WORK HARD
DREAM BIG
NEVER GIVE UP !!

Topic : Case of No Solution

$(2x+3y-7=0) \times 2$

$4x+6y-6=0$

$4x+6y-14=0$

$4x+6y-6=0$

$-8=0$ ✗

$\ominus$

$\frac{2}{4} \quad \frac{3}{6} \quad \frac{-7}{-6}$

$\frac{1}{2} = \frac{1}{2} \neq \frac{7}{6}$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

No solution.

Topic : Conditions For Solvability (or consistency)

If you want to be successful.

$2x+3y-6=0$

$4x+ky-12=0$

$\frac{a_1}{a_2}=\frac{2}{4}$ $\frac{b_1}{b_2}=\frac{3}{k}$ $\frac{c_1}{c_2}=\frac{-6}{-12}$

$\frac{1}{2}$ $\frac{3}{6}$ $\frac{1}{2}$

$\frac{1}{2}=\frac{1}{2}=\frac{1}{2}$

6 kyalava sabkuch.

$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

$\frac{2}{4}$ $\frac{3}{k}$ $\frac{-6}{-12}$

$k=6$ //

$\frac{2}{4}=\frac{3}{6}$ $\frac{6}{12}$

$\frac{1}{2}=\frac{1}{2}=\frac{1}{2}$

Topic : Miscellaneous Problems

#Q. Solve [NCERT]

$152x - 378y = -74$

$-378x + 152y = -604$

Topic : Condition of Solvability of Equations

#Q. Find the value of k for which the given system has a unique solution:

[NCERT]

(i) $x - ky = 2$

$3x + 2y = -5$

(i) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\frac{1}{3} \neq \frac{-k}{2}$

$-\frac{2}{3} \neq k$

All Real nos except $-\frac{2}{3}$.

(ii) $2x + ky = 1$

$5x - 7y = 5$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\frac{2}{5} \neq \frac{k}{-7}$

$-\frac{14}{5} \neq k$

Ans: All Real nos except $-\frac{14}{5}$.

Topic : Condition of Solvability of Equations

#Q. Find the value of k for which the given system has infinitely many solutions.

(i) $5x + 2y = k$

$10x + 4y = 3$

[NCERT]

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{5}{10} = \frac{2}{4} = \frac{k}{3}$

$\frac{2}{4} \leftarrow \frac{k}{3}$

$\frac{6}{4} = k$

$\frac{3}{2} = k$

Topic : Condition of Solvability of Equations

#Q. Find the value of k for which the given system has infinitely many solutions.

(ii) $kx + 3y = k - 3$

$12x + ky = k$

For infinite many solution $\rightarrow \boxed{\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}}$

$\frac{k}{12} = \frac{3}{k} = \frac{-k+3}{-k}$

$\frac{k}{12} = \frac{3}{k}$

$k^2 = 36$

$k = \pm\sqrt{36}$

$k = +6, -6$

$k = 6$

$\frac{6}{12} \quad \frac{3}{6} \quad \frac{-6+3}{-6}$

$\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$

Reject

$k = -6$

$\frac{-6}{12} \quad \frac{3}{-6} \quad \frac{-(-6)+3}{-(-6)}$

$\frac{-1}{2} \quad \frac{-1}{2} \quad \frac{9}{6}$

$\frac{-1}{2} = \frac{-1}{2} \neq \frac{3}{2}$

$x^2 = 4$

$x = 2, -2$ ///

$k^2 = 49$

$k = \pm\sqrt{49}$

± 7

$x^2 = 4$

$x = \pm\sqrt{4}$

$x = +2, -2$

Topic : Condition of Solvability of Equations

#Q. Find the value of k for which the given system has no solution:

(i) $3x - 4y + 7 = 0$

$kx + 3y - 5 = 0$

For no solution:

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

this implies

$$\frac{3}{k} = \frac{-4}{3} \neq \frac{7}{-5}$$

$$\Rightarrow \frac{3}{k} = \frac{-4}{3}$$

$$3 = \frac{-4k}{3}$$

$$\frac{-4k}{3} = 3$$

$$-4k = 9$$

$$k = \frac{9}{-4}$$

$$k = -\frac{9}{4}$$

For $k = -\frac{9}{4}$, the system will have no solution.

Topic : Condition of Solvability of Equations

#Q. Find the value of k for which the given system has no solution:

(ii) $2x - ky + 3 = 0$

$3x + 2y - 1 = 0$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\frac{2}{3} = \frac{-k}{2} \neq \frac{3}{-1}$$

$$\frac{2}{3} = \frac{-k}{2}$$

$$\frac{-k}{3} = k$$

Topic : Condition of Solvability of Equations

#Q. For what value of k will the following system of linear equations has no solution?

[NCERT, CBSE 2000]

$3x + y = 1$

$(2k - 1)x + (k - 1)y = 2k + 1$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\frac{3}{2k-1} = \frac{1}{k-1} \neq \frac{-1}{-2k-1}$$

$$\frac{3}{2k-1} = \frac{1}{k-1}$$

$3(k-1) = 1(2k-1)$

$3k - 3 = 2k - 1$

$3k - 2k = -1 + 3$

$k = 2$

Check...

$$\frac{3}{2(2)-1} = \frac{1}{2-1} \neq \frac{-1}{-2(2)-1}$$

$$\frac{3}{3} = \frac{1}{1} \neq \frac{-1}{-5}$$

$1 = 1 \neq \frac{1}{5}$

Topic : Condition of Solvability of Equations

#Q. Find the values of p and q for which the following system of equations has infinite number of solutions: [CBSE 2001]

$2x + 3y = 7$

$(p + q)x + (2p - q)y = 21$

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{2}{p+q} = \frac{3}{2p-q} = \frac{-7}{-21}$

$\frac{2}{p+q} = \frac{-7}{-21}$

$\frac{2}{p+q} = \frac{1}{3}$

$6 = p + q$ ①

$\frac{3}{2p-q} = \frac{-7}{-21}$

$\frac{3}{2p-q} = \frac{1}{3}$

$9 = 2p - q$ ②

$$p+q=6$$
$$2p+q=9$$

(+)

$$3p=15$$

$$3p=15$$

$$\boxed{p=5}$$

$$p+q=6$$

$$5+q=6$$

$$\boxed{q=1}$$

Topic : Condition of Solvability of Equations

#Q. For what values of m and n the following system of linear equations has infinitely many solutions. [Board Term – I, 2015]

$3x + 4y = 12$ and $(m + n)x + 2(m - n)y = 5m - 1$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{3}{m+n} = \frac{4}{2(m-n)} = \frac{-12}{-5m+1}$$

$$\frac{3}{m+n} = \frac{4}{2(m-n)}$$

$$3(m-n) = 2(m+n)$$

$$3m - 3n = 2m + 2n$$

$$3m - 2m - 3n - 2n = 0$$

$$m - 5n = 0 \quad \text{①}$$

$$\frac{3}{m+n} = \frac{-12}{-5m+1}$$

$$3(-5m+1) = -12(m+n)$$

$$-15m + 3 = -12m - 12n$$

$$-15m + 12m + 12n = -3$$

$$-3m + 12n = -3$$

$$3(-m + 4n) = -3$$

$$-m + 4n = -1 \quad \text{②}$$

$m - 5n = 0$

$-m + 4n = -1$

(+)

$-n = -1$

$n = 1$

$m - 5(1) = 0$

$m - 5 = 0$

$m = 5$

Topic : Condition of Solvability of Equations

#Q. For what value of k, will the system of equations [CBSE 2001]

$x + 2y = 5$

$3x + ky - 15 = 0.$

has no solution?

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\frac{1}{3} = \frac{2}{k} \neq \frac{-5}{-15}$

$\frac{1}{3} = \frac{2}{k} \neq \frac{1}{3}$

$k = 6$

There is no value of k for which the system will have no solution.

Topic : Condition of Solvability of Equations

Recap

#Q. Find the value(s) of k for which the system of equations

$kx - y = 2$

$6x - 2y = 3$ has

(i) A unique solution

(ii) No solution

Is there a value of k for which the system has infinitely many solution?

(i) $\frac{k}{6} \neq \frac{-1}{-2}$

$k \neq \frac{-6}{-2}$

$k \neq 3$

All Real nos except 3.

(ii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\frac{k}{6} = \frac{-1}{-2} \neq \frac{-2}{-3}$

$k = 3$

(iii) $\frac{k}{6}$ $\frac{-1}{-2}$ $\frac{-2}{-3}$

$\frac{k}{6}$ $\frac{1}{2}$ $\frac{2}{3}$

Topic : Condition of Solvability of Equations

#Q. For which value (s) of p, will the lines represented by the following pair of linear equations be parallel: **[CBSE SQP, 2020]**

$3x - y - 5 = 0$

$6x - 2y - p = 0$

Topic : Condition of Solvability of Equations

#Q. If $am \neq bl$, then the system of equations

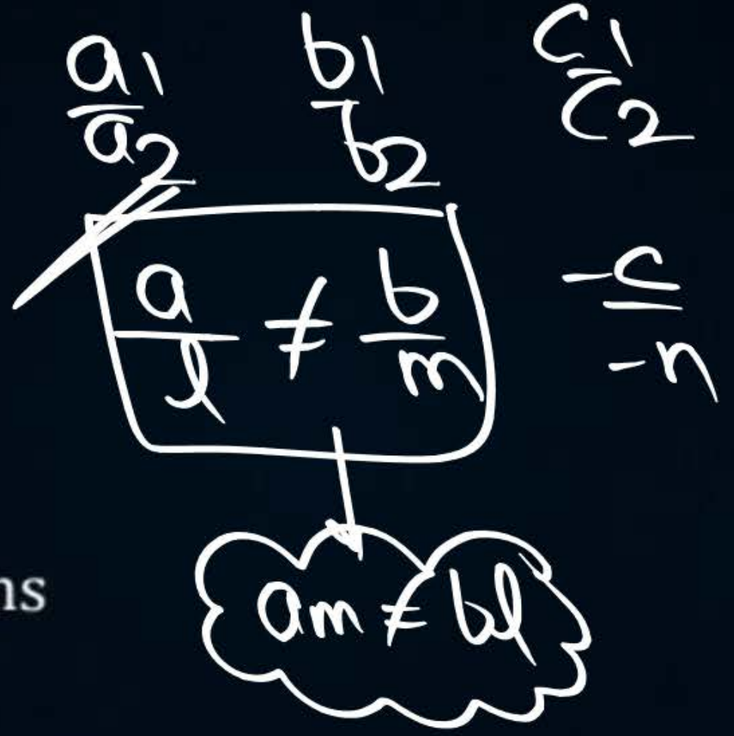
$$ax + by = c$$
$$lx + my = n$$

(A) has a unique solution

(B) has no solution

(C) has infinitely many solutions

(D) may or may not have a solution.



Topic : Condition of Solvability of Equations

#Q. One equation of a pair of dependent linear equations is $-5x + 7y = 2$. The second equation can be:

Infinite.

(A) $10x + 14y + 4 = 0$ ✗

(B) $-10x - 14y + 4 = 0$ ✗

(C) $-10x + 14y + 4 = 0$ ✗

(D) $10x - 14y = -4$ ✓

$\frac{-5}{10} \quad \frac{7}{-14} \quad \frac{-2}{-4}$

$\frac{-1}{2} = \frac{-1}{2} = \frac{-1}{2}$

Topic : Condition of Solvability of Equations

#Q. In the figure, ABCDE is a pentagon with BE||CD and BC||DE. BC is perpendicular to CD. AE = AB = 5 cm, BE = 7 cm, BC = x – y and CD = x + y. If the perimeter of ABCDE is 27 cm Find the value of x and y, given x, y ≠ 0.

[CBSE SQP, 2020]

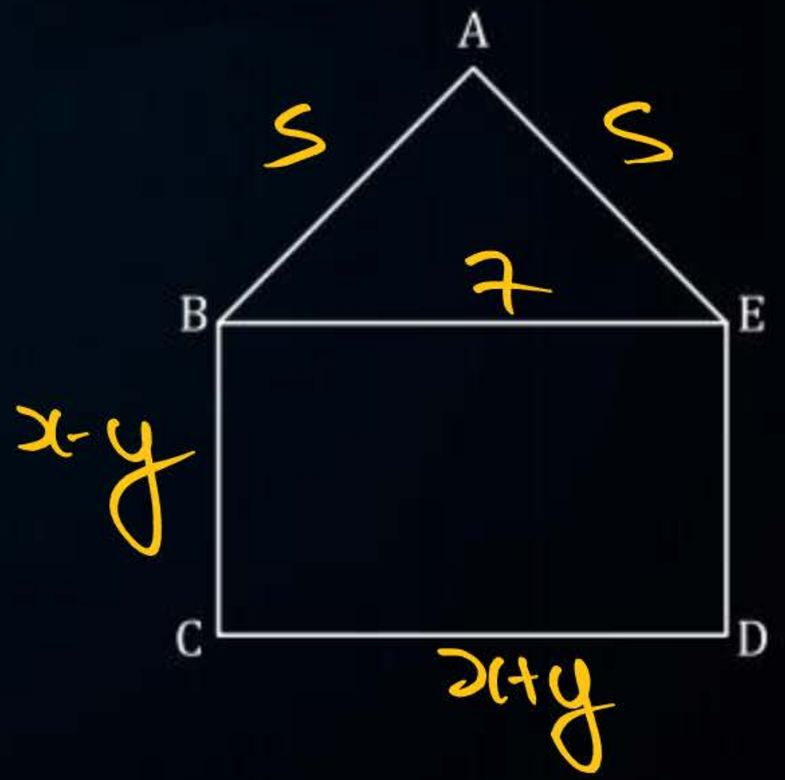
$x+y=7$

$AB+BC+CD+ED+AE=27$

$5+x-y+x+y+x-y+5=27$

$3x-y+10=27$

$3x-y=17$



Topic : Question Bank Question

#Q. Write an equation of a line passing through the point representing solution of the pair of linear equations $x + y = 2$ and $2x - y = 1$, How many such lines can we find?

Hw

Topic : Condition of Solvability

#Q. Determine the values of m and n so that the following system of linear equations have infinite number of solutions :

$(2m - 1)x + 3y - 5 = 0$

$3x + (n - 1)y - 2 = 0$

Topic : Condition of Solvability

#Q. If the system of equations

$2x + 3y = 7$

$2ax + (a + b)y = 28$

has infinitely many solutions, then

A $a = 2b$

B $b = 2a$

C $a + 2b = 0$

D $2a + b = 0$

$\frac{2}{2a} = \frac{3}{a+b} = \frac{-7}{-28}$

$\frac{1}{a} = \frac{3}{a+b}$ $\quad \frac{3}{a+b} = \frac{1}{4}$

$a+b = 3a$ $\quad 12 = a+b$

$b = 2a$

Topic : Condition of Solvability

#Q. Given the linear equation $3x + 4y = 9$. Write another linear equation in these two variables such that the geometrical representation of the pair so formed is:

[Board Term – 1, 2016]

(i) intersecting lines

(ii) coincident lines.

Homework

Last class DPP → Do today

THANK YOU