lulumath

Special Cases of Systems of Equations

Video Notes

Video Link

Special Cases of Systems of Equations

Solve the following system of equations:

$2(4x - 3y = 12)$

$8x - 6y = 24$

Substitution

Isolate y

$4x - 3y = 12$

$+3y \quad +3y$

$4x = 12 + 3y$

$-12 \quad -12$

$\frac{4x}{3} - \frac{12}{3} = \frac{3y}{3}$

$\left(\frac{4}{3}x - 4\right) = y$

$-\cancel{2}\cancel{x} \cdot \frac{4}{\cancel{3}}$, -2

$8x - 6y = 24$

$8x - 6\left(\frac{4}{3}x - 4\right) = 24$

$\cancel{8x} - \cancel{8x} + 24 = 24$

$24 = 24$

true stmt

elimination

$-2(4x - 3y = 12) \rightarrow -8x + 6y = -24$

$8x - 6y = 24 \rightarrow +8x - 6y = 24$

LCM of $4, 8 = 8$

$0 = 0$

true stmt.

Since both equations in the system are equivalent, they intersect everywhere along the line.

∴ any point on the line is a solution, making this system have infinite solutions.

∞

Solve the following system of equations:

$5x - 2y = 14$

$y - 6 = \frac{5}{2}x$

$-\frac{2}{1} \cdot \frac{5}{2}x$

substitution (Isolate y)

$y - 6 = \frac{5}{2}x$

$+6 \qquad +6$

$$\boxed{y = \frac{5}{2}x + 6}$$

$5x - 2y = 14$

$5x - 2\left(\frac{5}{2}x + 6\right) = 14$

$\cancel{5x} - \cancel{5x} - 12 = 14$

$-12 \neq 14$

NOT TRUE!

elimination:

$5x - 2y = 14$

$2\left(y - 6 = \frac{5}{2}x\right)$

$2y - 12 = 5x$

$-5x \qquad -5x$

$-5x + 2y - 12 = 0$

$+12 \quad +12$

$-\cancel{5x} + \cancel{2y} = 12$

$\cancel{5}x - \cancel{2}y = 14$

$0 \neq 26$

NOT TRUE!

$5x - 2y = 14$

$+2y \qquad +2y$

$5x = 14 + 2y$

$-14 \quad -14$

$\frac{5x}{2} - \frac{14}{2} = \frac{2y}{2}$

$\frac{5}{2}x - 7 = y$

$y = \frac{5}{2}x + 6$

same slopes

different y-int. } parallel lines.

→ Since the lines are parallel, they will never intersect

∴ this system has no solution.