12-5-13

3rd Trig

Systems of Equations

① $\begin{cases} 2x + y = 7 \\ y = x + 1 \end{cases}$

$2x + x + 1 = 7$

$3x + 1 = 7$

$-1 \quad -1$

$3x = 6$

$x = 2$ $\therefore y = 2 + 1$

$y = 3$

$(2, 3)$

② $\begin{cases} y = 3x - 1 \\ y = 2x + 5 \end{cases}$

$3x - 1 = 2x + 5$

$x = 6$ $\therefore y = 3(6) - 1$

$y = 17$

③ $\begin{cases} y = 2x - 1 \\ x - y = -1 \end{cases}$

$x - (2x - 1) = -1$

$x - 2x + 1 = -1$

$-x + 1 = -1$

$-1 \quad -1$

$-x = -2$

$\therefore x = 2$ $y = 2(2) - 1$

$y = 3$

Elimination

$2+4=6$
$+\ 1+5=6$
$3+9=12$ New equation is true

$$\begin{cases} 2x-y=7 \\ x+y=5 \end{cases}$$

$3x = 12$

$x=4$

$4+y=5$

$y=1$

$$\begin{cases} 2x+3y=8 \\ 5x-y=3 \end{cases}$$

$2x+3y=8 \Rightarrow 2x+3y=8$

$5x-y=3 \xRightarrow{\times 3} 15x-3y=9$

$17x = 17$

$x=1$

$2(1)+3y=8$

$2+3y=8$

$3y=6$

$y=2$

$$\begin{cases} 2x+7y=1 \\ 3x+5y=7 \end{cases}$$

$2x+7y=1 \xRightarrow{\times 3} 6x+21y=3$

$3x+5y=7 \xRightarrow{\times -2} -6x-10y=-14$

$11y=-11$

$y=-1$

$2x+7(-1)=1$

$2x-7=1$

$2x=8$

$x=4$

$$\begin{cases} 2x+y=4 \\ 4x+2y=5 \end{cases}$$

$2x+y=4 \xRightarrow{\times -2} -4x-2y=-8$

$4x+2y=5 \Rightarrow 4x+2y=5$

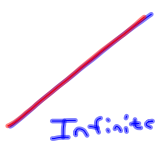
$0+0=-3$

$0 \neq -3$ False

∴ no solution because lines were parallel.

If we get a true statement like $0=0$ or $5=5$, etc., then the lines are on top of one another (coincident lines)

$$\begin{cases} y=2x+3 \\ 2y=4x+6 \end{cases}$$



Infinite # of solutions

At Denny's 3 eggs and 2 pieces of toast cost $4

4 eggs and 4 pieces of toast cost $6. How much are you paying for each egg and each piece of toast?

$$\begin{cases} 3e + 2t = 4 \\ 4e + 4t = 6 \end{cases}$$

M-2

$$-6e - 4t = -8$$
$$4e + 4t = 6$$

$$-2e = -2$$

$$e = 1$$

$$4(1) + 4t = 6$$

$$t = .50$$

12-5-13

4th Trig

Systems of Equations

$\begin{cases} y = 2x+1 \\ 3x+y = 11 \end{cases}$

$3x + (2x+1) = 11$

$5x+1 = 11$

$x = 2 \qquad y = 2(2)+1 = 5$

$(2,5)$

$\begin{cases} 2x+2y = 8 \\ y = x-4 \end{cases}$

$2x+2(x-4) = 8$

$2x+2x-8 = 8$

$x = 4 \quad \therefore y = 4-4 = 0$

$\begin{cases} x = y+3 \\ 2y - x = -2 \end{cases}$

$2y-(y+3) = -2$

$2y-y-3 = -2$

$y-3 = -2$

$y = 1 \qquad x = 1+3 = 4$

Elimination

$2+1 = 3$

$+ \; 4+3 = 7$

$6+4 = 10$ 3rd is true, too

$\begin{cases} 3x-y = 5 \\ + \; 4x+y = 9 \end{cases}$

$7x = 14$

$x = 2 \qquad 4(2)+y = 9$

$y = 1$

$\begin{cases} 3x+y=7 \\ 5x-2y=8 \end{cases}$ $\xrightarrow{M_2}$ $6x+2y=14$, $5x-2y=8$

$11x = 22$

$x=2$

$3(2)+y=7$

$y=1$

$\begin{cases} 5x+2y=9 \\ 6x+3y=12 \end{cases}$ $\xrightarrow{M_3}$ $-15x-6y=-27$, $\xrightarrow{M_2}$ $12x+6y=24$

$-3x = -3$

$x=1$

$5(1)+2y=9$

$y=2$

$\begin{cases} y=x+3 \\ 2x-2y=-6 \end{cases}$

$2x-2(x+3)=-6$

$2x-2x-6=-6$

$-6=-6$

True statement, so lines are on top of one another (coincident lines). Infinite number of solutions since infinite # of intersections.

If false statement like $7=0$, then lines are parallel and there are no solutions (no intersections)

At Waffle House 2 eggs and 3 pieces of toast cost $3.
3 eggs and 3 pieces of toast cost $4.50. How much are you paying for eggs and each piece of toast?

$\begin{cases} -2e-3t=-3.50 \\ 3e+3t=4.50 \end{cases}$

$e = 1$ $3(1)+3t=4$

$3t=1.50$

$t=\$.5$