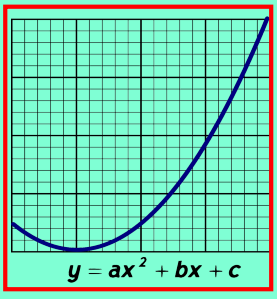
Math 125

Spring 2021

Lecture 10




Class QZ 8

Solve $|2x-7| \geq 9$, graph, S.B.N., I.N.

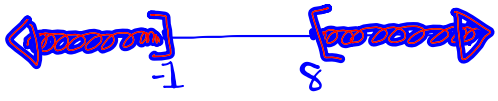
You must use methods discussed in this class.

Solve $|2x-7| = 9$

$2x-7=9$ OR $2x-7=-9$

$2x=16$ $\quad$ $2x=-2$

$\boxed{x=8}$ $\quad$ $\boxed{x=-1}$




S.B.N.

$\{x \mid x \leq -1 \text{ OR } x \geq 8\}$

I.N. $(-\infty, -1] \cup [8, \infty)$

Given $f(x) = |2x - 5|$

1) Find $f(-5)$

$f(-5) = |2(-5) - 5| = |-10 - 5|$

$= |-15| = \boxed{15}$

2) Solve $f(x) = -5$

$|2x - 5| = -5$

$\emptyset$

3) Solve $f(x) = 5$

$|2x - 5| = 5$

$\{0, 5\}$

$2x - 5 = 5$

$2x = 10$

$\boxed{x = 5}$

$2x - 5 = -5$

$2x = 0$

$\boxed{x = 0}$

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Is $(4, 3)$ a solution of $\begin{cases} x + 2y = 10 \\ 3x + 5y = 3 \end{cases}$ ?

$x + 2y = 10$

$4 + 2(3) = 10$

$4 + 6 = 10$

$10 = 10$ ✓

$3x + 5y = 3$

$3(4) + 5(3) = 3$

$12 + 15 = 3$

$27 = 3$

False

It did not work for both equations, so NO

Solve $\begin{cases} 3x - 4y = 24 \\ y = \frac{-3}{2}x + 3 \end{cases}$ by graphing.

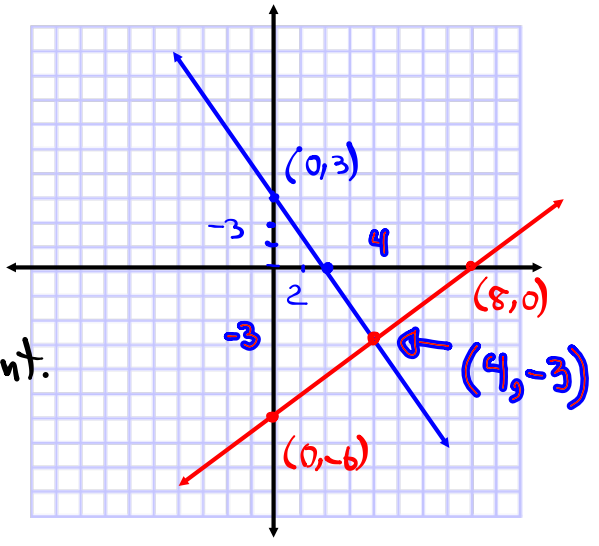
$3x - 4y = 24$

| $x$ | $y$ |
|---|---|
| $0$ | $-6$ |
| $8$ | $0$ |

$y = \frac{-3}{2}x + 3$

y-Int $(0,3)$

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




Equations are independent.

System is Consistent.

Solve $\begin{cases} 4x + 3y = -5 \\ x - y = -3 \end{cases}$ by Substitution Method.

Hint: Isolate a Variable with 1 in front of it

$x = y - 3$

$4(y-3) + 3y = -5$

$4y - 12 + 3y = -5$

$7y = -5 + 12$

$7y = 7$

$y = 1$

$x = 1 - 3$

$x = -2$

$\{(-2, 1)\}$

exactly one Solution

→ Equations are independent

→ System is Consistent

Solve by Subs. method:

$$\begin{cases} \frac{1}{6}x + \frac{1}{3}y = 8 & \text{LCD} = 6 \\ \frac{1}{4}x + \frac{1}{2}y = 12 & \text{LCD} = 4 \end{cases}$$

Hint: Use LCD for each equation to clear fractions.

$$\begin{cases} 6\cdot\frac{1}{6}x + 6\cdot\frac{1}{3}y = 6\cdot 8 \\ 4\cdot\frac{1}{4}x + 4\cdot\frac{1}{2}x = 4\cdot 12 \end{cases} \Rightarrow \begin{cases} x + 2y = 48 \\ x + 2y = 48 \end{cases}$$

Infinite # of Solutions

$\{(x,y) \mid x + 2y = 48\}$

$\{(48-2y, y) \mid y \text{ is a real \#}\}$

$x = 48 - 2y$

$48 - 2y + 2y = 48$

$48 = 48$ True

Infinite # of Solutions

- Equations are dependent
- System is Consistent

Solve by Subs.

$$\begin{cases} 2x + 8y = 3 \\ x + 4y = 8 \end{cases} \Rightarrow x = 8 - 4y$$

$2(8-4y) + 8y = 3$

$16 - 8y + 8y = 3$

$16 = 3$

False

$\Rightarrow$ NO Solution

When no Solution

- Equations are independent
- System is inconsistent

Solve by addition/elimination Method

$$\begin{cases} 2x - y = 11 \\ -5x + y = -26 \end{cases}$$

$-3x = -15$

$\boxed{x = 5}$

$2(5) - y = 11$

$10 - y = 11$

$\boxed{y = -1}$

$(5, -1)$

Independent Eqns

Consistent System

Solve by elimination Method:

$$2\begin{cases} 4x - 5y = -18 \\ 5\begin{cases} 3x + 2y = -2 \end{cases} \end{cases} \Rightarrow \begin{cases} 8x - 10y = -36 \\ 15x + 10y = -10 \end{cases}$$

$23x = -46$

$\boxed{x = -2}$

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

$-6 + 2y = -2$

$2y = -2 + 6$

$2y = 4$

$\boxed{y = 2}$

$\boxed{(-2, 2)}$

Solve. $2\{ 2x + 3y = -15$
$3\{ 5x + 2y = 1$
$\Rightarrow \begin{cases} -4x - 6y = 30 \\ 15x + 6y = 3 \end{cases}$

$11x = 33$

$x = 3$

$5(3) + 2y = 1$

$15 + 2y = 1$

$2y = -14$ $\quad y = -7$

$(3, -7)$

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41 tickets Sold.

$307 Collected

Adults pay $11

Kids pay $5

How many of each?

A → Adults

K → Kids

$-5\{ A + K = 41$
$11A + 5K = 307$

$\begin{cases} -5A - 5K = -205 \\ 11A + 5K = 307 \end{cases}$

$6A = 102$

$A = 17$

$A + K = 41$

$17 + K = 41$

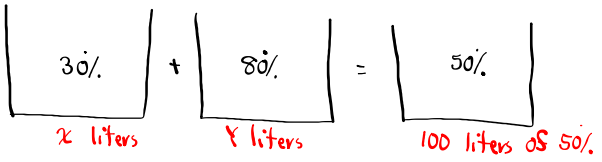
$K = 24$

17 adults & 24 Kids

Unlimited Supply of 30% alcohol & 80% alcohol.

Jose needs 100 L of 50% alcohol.

How does he have to mix to obtain what he needs?




$$\begin{cases} x + y = 100 \\ 30\%\,x + 80\%\,y = 50\%\,(100) \end{cases} \Rightarrow \begin{cases} x + y = 100 \\ 30x + 80y = 50(100) \end{cases} \quad \begin{matrix} \cdot 100 \\ \div 10 \end{matrix}$$

$$\begin{cases} x + y = 100 \\ 3x + 8y = 500 \end{cases} \quad \begin{matrix} \cdot(-3) \\ \\ \end{matrix} \Rightarrow \begin{cases} -3x - 3y = -300 \\ 3x + 8y = 500 \end{cases} \Rightarrow 5y = 200 \quad y = 40 \quad x = 60$$

60 Liters of 30% alcohol & 40 " " 80% "

39 Coins ✓

✓ Quarters & Dimes only

Total Value $7.50

How many of each?

R → Quarters

D → Dimes

$$\begin{cases} R + D = 39 \\ .25R + .10D = 7.50 \end{cases} \quad \cdot 100$$

$$\begin{cases} R + D = 39 \\ 25R + 10D = 750 \end{cases} \quad \div 5 \qquad \begin{cases} R + D = 39 \\ 5R + 2D = 150 \end{cases} \quad \cdot(-2) \Rightarrow \begin{cases} -2R - 2D = -78 \\ 5R + 2D = 150 \end{cases}$$

$$3R = 72$$

$$R = 24$$

24 Quarters & 15 Dimes

Candy type A → \$1.20 / lb.

Candy type B → \$1.80/ lb.

Maria need 45 pounds at \$1.40 /lb.

How many pounds of each?

| Candy A | + | Candy B | = | Mixture |
|---|---|---|---|---|
| \$1.20/lb | | \$1.80/lb | | \$1.40 / lb. |
| A | | B | | 45 |

$$\begin{cases} A + B = 45 \\ 1.20A + 1.80B = 1.40(45) \end{cases} \Rightarrow \begin{cases} A + B = 45 \\ 1.2A + 1.8B = 1.4(45) \end{cases} \quad (\times 10)$$

$$\begin{cases} A + B = 45 \\ 12A + 18B = 14(45) \end{cases} \quad (\div 3) \Rightarrow \begin{cases} A + B = 45 \\ 4A + 6B = 14(15) \end{cases}$$

$$\begin{cases} A + B = 45 \\ 4A + 6B = 210 \end{cases} \quad (-4) \Rightarrow \begin{cases} -4A - 4B = -180 \\ 4A + 6B = 210 \end{cases}$$

$2B = 30 \Rightarrow \boxed{B = 15}$

$\boxed{A = 30}$

30 lb. of Type A, 15 lb. of B.

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Two angles are complementary → Total = 90°

one of them is twice the other one.

Find both angles.

→ A & B

$$\begin{cases} A + B = 90 \\ A = 2B \end{cases}$$

$2B + B = 90$

$3B = 90$

$\boxed{B = 30}$

$\boxed{A = 60}$

→ 30° & 60°

Find two Complementary angles Such that one of them is 10° more than 3 times the other one.

$A + B = 90$

$A = 3B + 10$

$\begin{cases} A + B = 90 \\ A = 3B + 10 \end{cases}$

$3B + 10 + B = 90$

$4B = 80$

$B = 20$ $\quad A = 70$

$20° \text{ & } 70°$

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Two angles A & B are Supplementary. → Total $= 180°$

One of them is 20° less than the other one.

Find both angles.

$\begin{cases} A + B = 180° \\ A = B - 20 \end{cases}$

$B - 20 + B = 180$

$2B = 200$

$B = 100$ $\quad A = 80$

$80° \text{ & } 100°$

Find two supplementary angles such that the sum of twice one of them and three times the other one is 470°.

$$-2\begin{cases} A + B = 180 \\ 2A + 3B = 470 \end{cases} \Rightarrow \begin{cases} -2A - 2B = -360 \\ 2A + 3B = 470 \end{cases}$$

$B = 110$

$A = 70$

70° & 110°

Exam 1: Monday

You can start as early as 6:45AM

It Ends at 9:10, resume lecture at 9:15

Study guides 0 to 7.

Math is Cumulative.

Camera On, Mic. On.

You must use same methods as lectures.