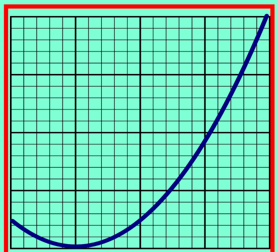
Math 125

Fall 2021

Lecture 22



$y = ax^2 + bx + c$

Class QZ 17

Exam II
Next
Thursday

1) $\boxed{f(x) = 2x - 3}$ $\boxed{g(x) = 4x^2 + 6x + 9}$

Find $(f \cdot g)(x) = (2x-3)(4x^2+6x+9)$

Product

$= 8x^3 + \cancel{12x^2} + \cancel{18x} - \cancel{12x^2} - \cancel{18x} - 27$

$= \boxed{8x^3 - 27}$

Binomial

Deg. 3

LCD 8

Const -27

2) Simplify $\dfrac{x^2 - 12x + 36}{x^2 - 36}$

Rational Expression

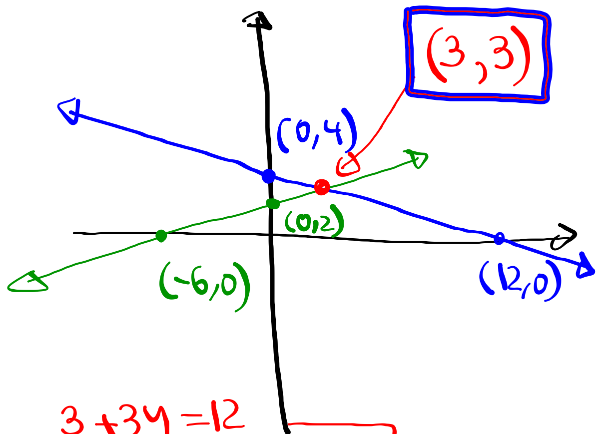
$$= \frac{(x-6)\cancel{(x-6)}}{(x+6)\cancel{(x-6)}} = \boxed{\frac{x-6}{x+6}}$$

Solve by graphing

$$\begin{cases} x + 3y = 12 \\ x - 3y = -6 \end{cases}$$

x	y
0	4
12	0

x	y
0	2
-6	0



$$\begin{cases} x + \cancel{3y} = 12 \\ x - \cancel{3y} = -6 \end{cases}$$

$2x = 6 \qquad \boxed{x=3}$

$3 + 3y = 12$

$3y = 9 \qquad \boxed{y=3}$

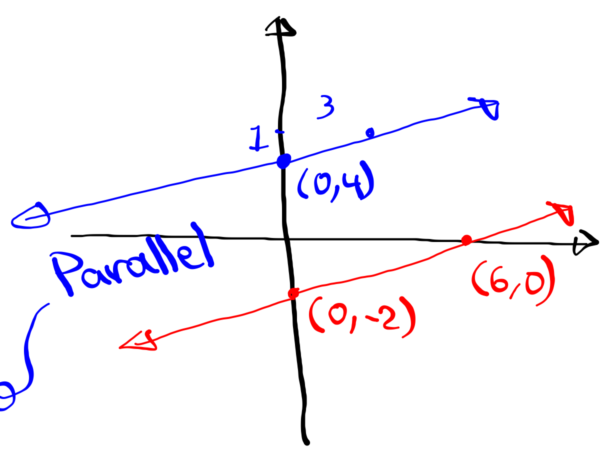
Solve by graphing

$$\begin{cases} x - 3y = 6 \\ y = \frac{1}{3}x + 4 \end{cases}$$

x	y
0	-2
6	0

Y-Int (0,4)

$m = \frac{1}{3}$



NO Solution

$x - 3\left(\frac{1}{3}x + 4\right) = 6$

$x - \cancel{3} \cdot \frac{1}{\cancel{3}}x - 3 \cdot 4 = 6$

$\cancel{x} - \cancel{x} - 12 = 6$

$-12 = 6$ False

$\varnothing$

Solve by Subs. method

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

← Isolate x $\quad x=-1-2y$

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

$-2-4y-y=3$

$-5y=3+2$

$-5y=5$

$\boxed{y=-1}$

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

$=-1+2$

$\boxed{x=1}$

Final Answer $(1,-1)$

Solve by addition (Elimination) method:

$$\begin{array}{l} 4 \\ 3 \end{array}\begin{cases} 2x-3y=2 \\ 5x+4y=51 \end{cases} \Rightarrow \begin{cases} 8x-\cancel{12y}=8 \\ 15x+\cancel{12y}=153 \end{cases}$$

$23x=161$

$x=\frac{161}{23}$ $\quad \boxed{x=7}$

$5x+4y=51$

$5(7)+4y=51$

$35+4y=51$

$4y=51-35$

$4y=16$ $\quad \boxed{y=4}$

Final Ans $(7,4)$

when there is exactly one Solution:

- System is Consistent
- Equations are independent

when There are infinite number of Solutions:

- System is Consistent
- Equations are dependent

when there is no Solution:

- System is inconsistent
- Equations are independent.

Solve

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

Since Y in 2nd equation is already isolated, we can use Subs. method.

$$3x - 2\left(\frac{3}{2}x + 6\right) = 6$$

$$3x - \cancel{2} \cdot \frac{3}{\cancel{2}}x - 2 \cdot 6 = 6$$

$$\cancel{3x} - \cancel{3x} - 12 = 6$$

$$-12 = 6$$

→ False

No Solution

System: Inconsistent

Equations: Indep.

Solve by method of your choice:

$$2\begin{cases} 4x - 3y = -5 \\ -8x + 6y = 10 \end{cases} \Rightarrow \begin{cases} \cancel{8x} \cancel{-6y} = \cancel{-10} \\ \cancel{-8x} \cancel{+6y} = \cancel{10} \end{cases}$$

$0 = 0$

True

infinite # of solutions

System is consistent, and equations are dependent.

Two angles are complementary $\rightarrow$ Sum $= 90°$

x & y

Their difference is $70°$.

Find both angles. $\longrightarrow$ $80°$ & $10°$

$$\begin{cases} x + \cancel{y} = 90 \\ x - \cancel{y} = 70 \end{cases}$$

$2x = 160$

$\boxed{x = 80}$

$80 + y = 90$

$\boxed{y = 10}$

Two angles are supplementary Sum = 180°
x & y

One of them is 30° less than the other one

Find both angles. → $\boxed{105° \text{ \& } 75°}$

$$\begin{cases} x + y = 180 \\ x = y - 30 \end{cases}$$

Use Subs. method

$$y - 30 + y = 180$$

$$2y - 30 = 180$$

$$2y = 210$$

$$\boxed{y = 105}$$

$$x = 105 - 30$$

$$\boxed{x = 75}$$

For a field trip, School bought 20 Tickets.

Adults pay \$12/TKT A → Adults

Kids pay \$5/TKT K → Kids

Total Cost = \$135

How many of each?

$$-5\begin{cases} A + K = 20 \\ 12A + 5K = 135 \end{cases}$$

$$\begin{cases} -5A \cancel{- 5K} = -100 \\ 12A \cancel{+ 5K} = 135 \end{cases}$$

$$7A = 35$$

$$\boxed{A = 5}$$

$$A + K = 20$$

$$5 + K = 20$$

$$\boxed{K = 15}$$

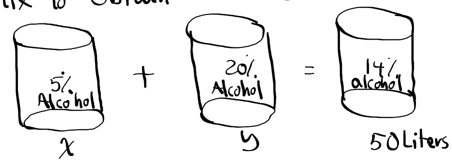
→ 5 Adults, 15 Kids

October 7, 2021

John needs 50 Liters of 14% alcohol.

Maria has unlimited supply of 5% & 20% alcohol.

How many liters of each should Maria mix to obtain what John needs?



$$100\begin{cases} x + y = 50 \\ 5\%x + 20\%y = 14\%(50) \end{cases} \qquad \div 5\begin{cases} x + y = 50 \\ 5x + 20y = 14(50) \end{cases}$$

$$-1\begin{cases} x + y = 50 \\ x + 4y = 140 \end{cases} \Rightarrow \begin{cases} \cancel{-x} - y = -50 \\ \cancel{x} + 4y = 140 \end{cases}$$

$$3y = 90 \qquad \boxed{y = 30}$$

$$x + 30 = 50$$

$$\boxed{x = 20}$$

20 L of 5% alcohol

30 L of 20% alcohol

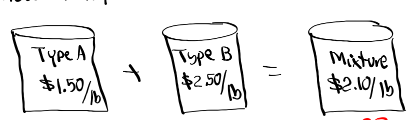
Candy Store has two type of candies.

Type A → \$1.50/lb

Type B → \$2.50/lb

They need 100 lb of mix at \$2.10/lb.

How many Pounds of each?



$$A + B = 100$$

$$100\begin{cases} A + B = 100 \\ 1.50A + 2.50B = 2.10(100) \end{cases} \qquad \div 10\begin{cases} A + B = 100 \\ 150A + 250B = 210(100) \end{cases}$$

$$\div 5\begin{cases} A + B = 100 \\ 15A + 25B = 21(100) \end{cases} \rightarrow \begin{cases} A + B = 100 \\ 3A + 5B = 21(20) \end{cases}$$

$$-3\begin{cases} A + B = 100 \\ 3A + 5B = 420 \end{cases} \Rightarrow \begin{cases} -3A - 3B = -300 \\ 3A + 5B = 420 \end{cases}$$

$$2B = 120$$

$$\boxed{B = 60}$$

$$A + B = 100$$

$$A + 60 = 100 \qquad \boxed{A = 40}$$

40 lb of Type A

60 lb of Type B

SG 7 ✓

Class QZ 18

1) $f(x) = 2x+5 \qquad g(x) = 2x-5$

Find $(f+g)(x) = 2x+5+2x-5 = \boxed{4x}$

$(f-g)(x) = 2x+5-(2x-5) = 2x+5-2x+5$

$= \boxed{10}$

2) Simplify: $\dfrac{x^2-100}{x^2-20x+100} = \dfrac{(x+10)(x-10)}{(x-10)(x-10)}$

$= \boxed{\dfrac{x+10}{x-10}}$