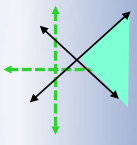
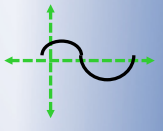
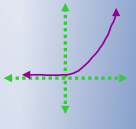
$5x-2y \leq 75$



$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$



$S = Pe^{rt}$



$APY = (1+\frac{r}{n})^{n}-1$

Math 1090 ~ Business Algebra

Section 1.4 Systems of Linear Equations

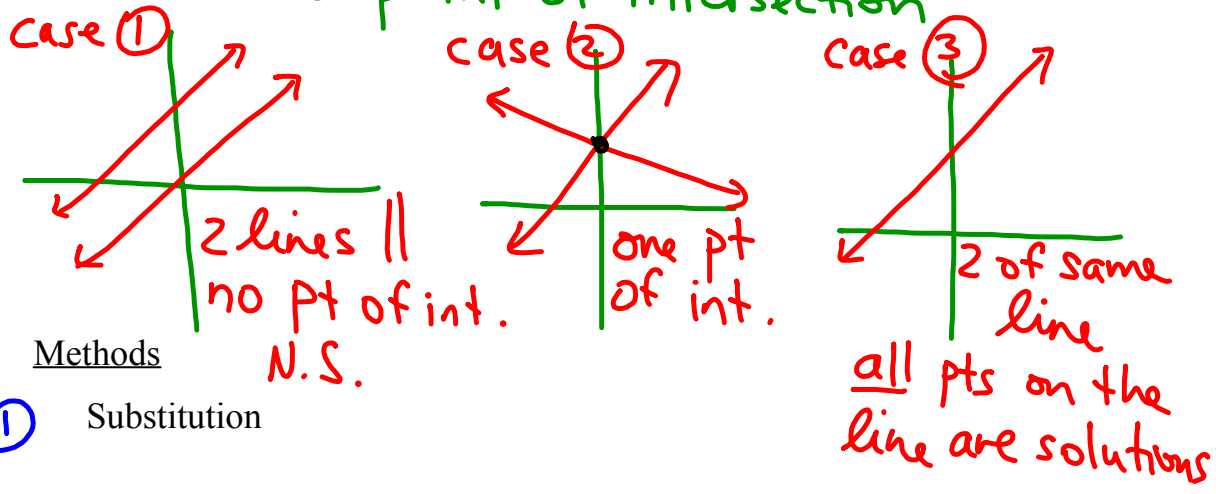
Objectives:

- Solve a system of linear equations to find the intersection point.
- Determine if there are no solutions, one solution, or many solutions to a system of linear equations.

Vocabulary

System of linear equations: two or more linear eqns that we want to solve simultaneously

Solution: the point of intersection



Methods

1. Substitution
2. Elimination

Ex 1: Solve $3(2x+3y)=-x+y$ (A)
$x+5=2-5y$ (B)

① use substitution

(B) $x+5=2-5y$

$x=-3-5y$

(A) $3(2(-3-5y)+3y)=-(-3-5y)+y$

$3(-6-10y+3y)=3+5y+y$

$-18-30y+9y=3+6y$

$-18-21y=3+6y$

$-21=27y$

$y=\frac{-21}{27}=\frac{-7}{9}$

$x=-3-5y$

$=-3-5\left(\frac{-7}{9}\right)$

$x=\frac{-27}{9}+\frac{35}{9}$

$x=\frac{8}{9}$

soln: $\left(\frac{8}{9}, \frac{-7}{9}\right)$

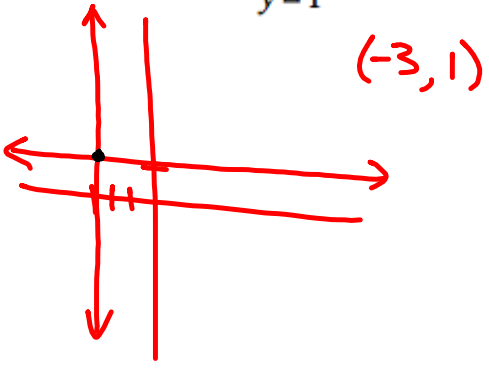
Substitution Steps

① choose one eqn & solve for one of the variables

② substitute that expression (from ①) into OTHER eqn and solve for the other variable

③ substitute the other variable value into an eqn to solve for first variable

Ex 2: Solve $x=-3$
$y=1$



use substitution

Ex 3: Solve $x-\frac{3}{4}y=-9$ (A)

$\frac{1}{3}x=\frac{1}{4}y-3$ (B)

(B) $3\left(\frac{1}{3}x\right)=\left(\frac{1}{4}y-3\right)3$

$x=\frac{3}{4}y-9$

(A) $\frac{3}{4}y-9-\frac{3}{4}y=-9$ → $-9=-9$ ✓ true

⇒ both lines are the same line (all pts on the line are soluths)

Ex 4: Solve $3x+15y=-5$ (A)

$3(-x-5y=2)$ (B)

(A) $3x+15y=-5$

+(B) $-3x-15y=6$

$0=1$

⇒ N.S.

Ex 5: Solve $3x+4y=31$ (A)

$-4(-2x+y=5)$ (B)

(A) $3x+4y=31$

(B) + $8x-4y=-20$

$11x=11$

$x=1$

(B) $-2(1)+y=5$

$y=7$

Soln: $(1,7)$

Method of Elimination

1. Ensure that both eqns are written in same order
2. multiply one or both eqns by nonzero constant to make coefficients of one of the variables match (or be opposites)
3. Add "straight down"
4. solve for the variable in the resulting eqn from 3
5. plug in to original eqn to get other variable value

Ex 6: Solve $5z = 15$, $x - 2y + 3z = 17$, $2x + 3y + z = 12$

(A) $z = 3$

(B) $x - 2y + 9 = 17$

(C) $2x + 3y + 3 = 12$

(B) $-2(x - 2y = 8)$

(C) $2x + 3y = 9$

$\Leftrightarrow$

(B) $-2x + 4y = -16$

(C) $+\ 2x + 3y = 9$

$7y = -7$

$y = -1$

(B) $x - 2(-1) = 8$

$x + 2 = 8$

$x = 6$

$\Rightarrow$ soln: $(6, -1, 3)$

Ex 7: Jack's basketball team scored 41 less than two times the number of points that Dylan's team scored. The sum of both teams' final points was 106. How many points did each team score?

x = pts for Jack's team

y = " " Dylan's "

(A) $x = 2y - 41$

(B) $x + y = 106$

(I'll use substitution)

(B) $2y - 41 + y = 106$

$3y - 41 = 106$

$3y = 147$

$y = 49$

(B)

$\Rightarrow x + 49 = 106$

$x = 57$

$\Rightarrow$ Jack's team scored 57 pts

Dylan's team scored 49 pts