Present Wednesday: 8.3 #59, 63, 65
9:55 Rachel Roc., Hannah, Chelsea, Molly, Amy, Jared Taf.
11:00 Jamie Sch., Victoria, Abbey, Kelly, Jeffrey, Kayla Tet.

Homework: 8.7 #3, 5, 9-21 odd, 25, 27, 32, 33, 53, 59, 60

Present Thursday: #15, 19, 25
9:55 Briana Tor., Rachel, Jena, Rebekah Wol., Luke, Arie
11:00 Kelly Tom., Calli, Molly, Tyson You., Colin, Janessa

Surpreme Court Race: (as of 11:37 am)
1,470,000+ votes counted
739,043 for Prosser
739,379 for Kloppenburg
(difference: 336 votes)
Margin of error: $\pm$1,216 votes

## Motivating Example: Ticket Sales

(8.7 Hw #73) Tickets to a production of *Othello* at Nicholls State University cost \$2.50 for general admission or \$2.00 with student ID. If 184 people paid to see a performance and \$406 was collected, how many were admitted at the student rate?

Define variables:
Let x = # general tickets sold.
Let y = # student tickets sold.

Write equation(s) to represent the given information.

$$\begin{cases} x + y = 184 \\ \$2.50x + \$2.00y = \$406 \end{cases}$$

Solve the equation(s) and answer the question.
(next slide)

## Motivating Example: Ticket Sales

(8.7 Hw #73) Tickets to a production of *Othello* at Nicholls State University cost \$2.50 for general admission or \$2.00 with student ID. If 184 people paid to see a performance and \$406 was collected, how many were admitted at the student rate?

$$\begin{cases} x + y = 184 \\ 2.5x + 2y = 406 \end{cases}$$

guess: $x = 100,\ y = 84$
$2.5(100) + 2(84) \stackrel{?}{=} 406$
$250 + 168 = 418 \neq 406$

① $x = 184 - y$
$\Rightarrow 2.5(184 - y) + 2y = 406$

or

② $-2x - 2y = -368$
$+ (2.5x + 2y = 406)$
$0.5x = 38$

$x = 76$ general tickets
$y = 108$ student tickets

## 8.7 - Solving Systems of Equations

Two basic techniques:
1. Elimination
   (based on the principle: if (a=b and c=d) then a+c = b+d)
2. Substitution
   (based on the substitution axiom)

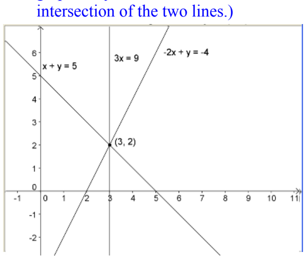
Example 1: Solve by Elimination

(Note that the solution can be verified graphically: it is shown below as the intersection of the two lines.)

$x + y = 5$
$+\ 2x - y = 4$
$3x = 9$
$x = 3$

$3 + y = 5 \Rightarrow y = 2.$

Solution: $(3, 2)$
$(x, y)$.



## 8.7 - Solving Systems of Equations

Two basic techniques:

1. Elimination
   (based on the principle: if (a=b and c=d) then a+b = c+d)
2. Substitution
   (based on the substitution axiom)

Example 2: Solve by Elimination

(Note that the solution can be verified graphically: it is shown below as the intersection of the two lines.)

$3x + 2y = 5$

$+\quad -2x + 3y = -12$

$x + 5y = -7$

$2(3x + 2y) = (5)2$

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

$\Rightarrow 6x + 4y = 10$

$-6x + 9y = -36$

$13y = -26$

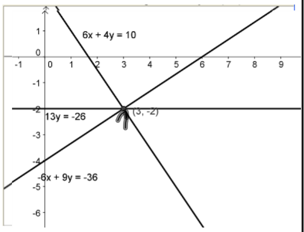
$y = -2 \Rightarrow 3x + 2(-2) = 5$

$3x - 4 = 5$

$3x = 9$

$x = 3$

$(3, -2)$




Example 3: Solve by Substitution

(Note that the solution can be verified graphically: it is shown below as the intersection of the two lines.)

$3x - 2y = 17$

$4x - 1 = y$

$3x - 2(4x - 1) = 17$

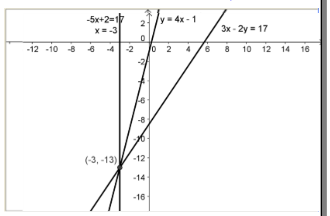
$3x - 8x + 2 = 17$

$-5x = 15$

$x = -3$

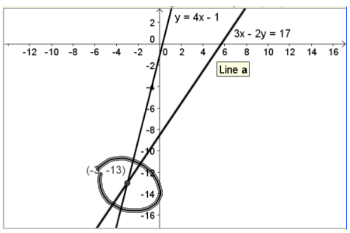
$y = 4(-3) - 1 = -13$

Solution: $(-3, -13)$




## Sec. 8.7 - Systems of Lines

Two linear equations may or may not share a common solution. If they do, they are called **independent** equations (and as a pair, they form a **consistent system**).




Solution set here is the set {(-3, -13)}.

## Sec. 8.7 - Systems of Lines

It is also possible the two lines are parallel, in which case they will not meet; they form an **inconsistent system** and there is no common solution.

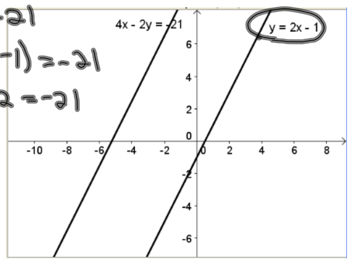
$4x - 2y = -21$

$4x - 2(2x - 1) = -21$

$4x - 4x + 2 = -21$

$2 = -21$

$\emptyset$

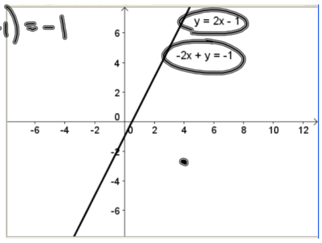



Solution set here is the empty set, {}, or $\phi$.

Lastly, the two lines might turn out to be the same line (perhaps represented via two different equations). Such equations are called **dependent**, and they share an infinite number of solutions -- namely, the points on the line.

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

$-1 = -1$




Solution set here is $\{(x,y) : y = 2x - 1\}$, or equivalently, $\{(x, 2x-1)\}$

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