**Notes 6-2**

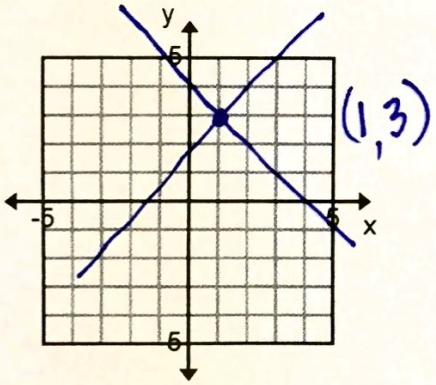
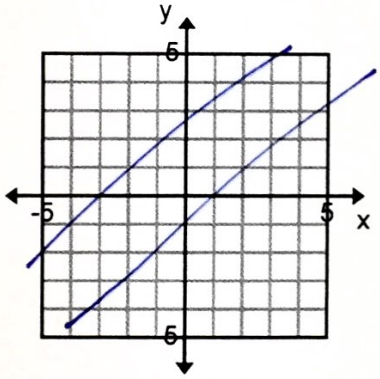
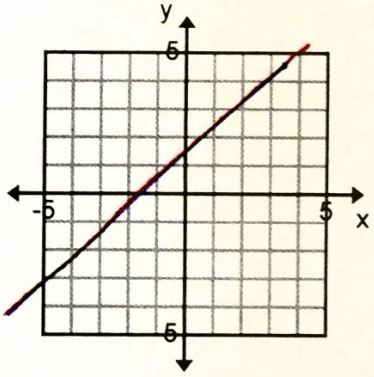
**Sec 1 H** **Solving Systems of Equations using Graphing & Substitution** **Unit 6**

- **Systems of Two Linear Equations:**
  We solve 2 equations at the same time

- **A Solution to a System of Equations:**
  the place where 2 equations intersect

  A point $(x, y)$

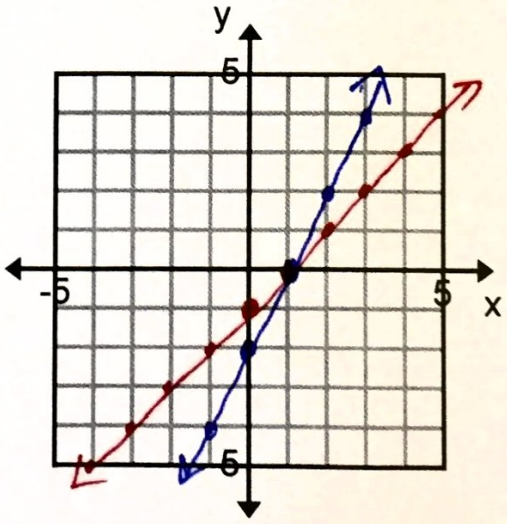
## Number of Solutions of a Linear System:

| Exactly One Solution: | No Solution: | Infinitely Many Solutions ($\infty$ **many**): |
|---|---|---|
|   |   |   |

**Solve the system using a graph.**

**Ex. 1:** $\begin{cases} y = x - 1 \\ y = 2x - 2 \end{cases}$

$(1, 0)$



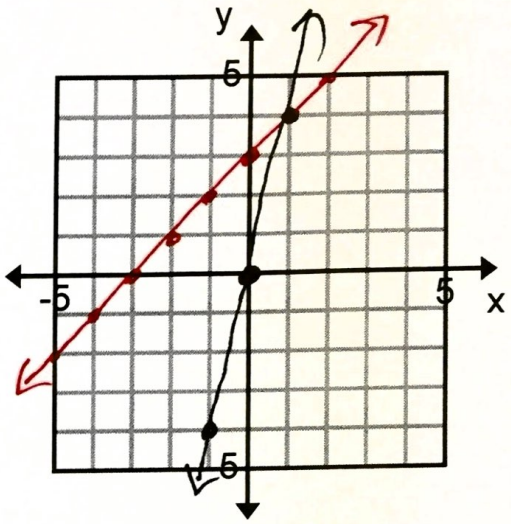
# Notes 6-2

## Solving Systems of Equations using Graphing & Substitution



**Ex. 2:** $\begin{cases} y = 4x + 0 \\ y = x + 3 \end{cases}$

$(1, 4)$




**Ex. 3:** $\begin{cases} y = 2x + 2 \\ y = 3^x \end{cases}$ Exponential

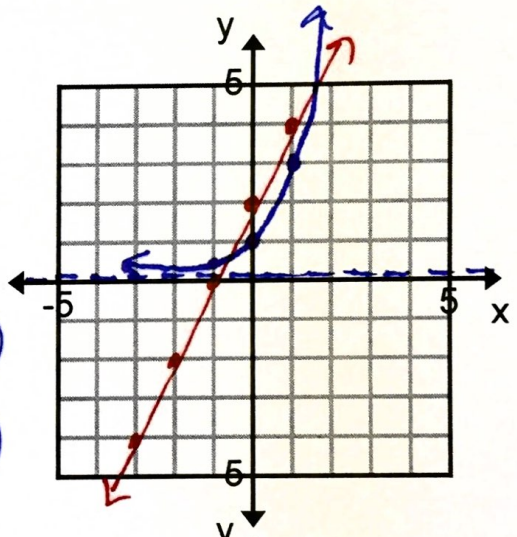
| | |
|---|---|
| -1 | 1/3 |
| 0 | 1 |
| 1 | 3 |

$a \cdot b^x$

$a$ ↓ starting amount

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

$(1.5, 5)$

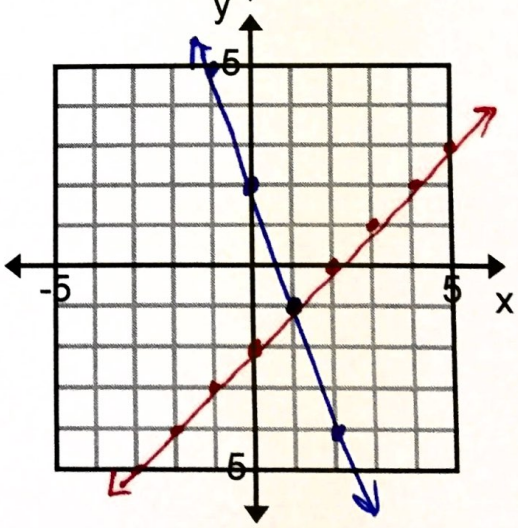



**Ex. 4:** $\begin{cases} 3x + y = 2 \\ x - y = 2 \end{cases}$

$y = -3x + 2$

$y = x - 2$

$(1, -1)$



## Steps for Substitution Method:

Step 1: Find a variable that is easy to solve for
OR
Step 2: Find a variable that is all alone on one side of the equation.
Step 3: Go to the other equation & plug in the disguise for the variable
Step 4: Solve for the variable that is left.

Step 5: Plug in your answer to one of the original equations, & solve for the other variable

**Solve the system of equations using substitution.**

Ex. 5: $\begin{cases} y = 3x - 8 \\ y = 4 - x \end{cases}$

$3x - 8 = 4 - x$
$+x \quad +x$
$4x - 8 = 4$
$+8 \quad +8$
$\frac{4x}{4} = \frac{12}{4}$
$x = 3$

$y = 4 - x$
$y = 4 - 3$
$y = 1$

(3, 1)

Ex. 6: $\begin{cases} y = -x \\ -2x + y = -6 \end{cases}$

$-2x + -x = -6$
$\frac{-3x}{-3} = \frac{-6}{-3}$
$x = 2$

$y = -2$

(2, -2)

**Solve the system of equations using substitution.**

Ex. 7: $\begin{cases} 2x+3y=5 \\ -2x+y=-17 \end{cases}$

$+2x \quad +2x$

$y = 2x-17$

$2x+3(2x-17)=5$

$2x+6x-51=5$

$8x-51=5$

$+51 \quad +51$

$\frac{8x}{8}=\frac{56}{8}$ $x=7$

$y=2(7)-17$

$14-17$ $y=-3$

$(7,-3)$

Ex. 8: $\begin{cases} 2x+2y=3 \\ x-4y=-1 \end{cases}$

Ex. 9: $\begin{cases} -5x+5y=22 \\ x-y=2 \end{cases}$

$+y \quad +y$

$x = y+2$

$-5(y+2)+5y=22$

$-5y-10+5y=22$

$-10 \neq 22$

No Sol

when the variable disappears

| Number of Solutions of a Linear System: | | |
|---|---|---|
| Exactly One Solution: | No Solution: | Infinitely Many Solutions ($\infty$ **many**): |
| variable stays<br>$x=2$ $y=-3$<br>$(2,-3)$ | 2 #s that aren't =<br>$-10 \neq 22$ | 2 #s that ARE =<br>$0=0$<br>$-10=-10$ |