

## 2.6 Special Types of Linear Systems

3 types of solutions:

- 1) Lines intersect - one solution (x,y)
- 2) Lines are parallel - no solution
- 3) Lines coincide - infinitely many solutions

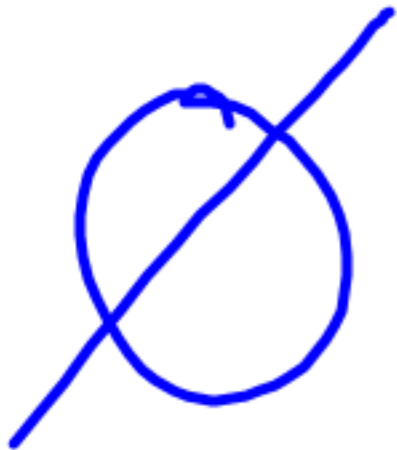
$$y = mx + b$$

$$\begin{array}{r} -2x \\ 2x + y = 5 \\ 2x + y = 1 \\ -2x \end{array}$$

$$y = -\underline{2}x + 5$$
$$y = -\underline{2}x + 1$$

Slope Same  
-2

y-int (b) diff  
5  
+1



$$\begin{array}{r} \cancel{+2x} \\ -2x + y = 3 \end{array}$$

$$y = 2x + 3$$

$$\begin{array}{r} \cancel{+4x} \\ -4x + 2y = 6 \end{array}$$

$$y = 2x + 3$$

$$\frac{2}{2}y = \frac{4}{2}x + \frac{6}{2}$$

Slope same  
2

Y-int (b) same  
3

inf. many  
Sols

$$\begin{aligned} 4x - 2y &= 6 \\ -2x + y &= -3 \end{aligned}$$

$\rightarrow$

$$\begin{array}{r} \cancel{4x - 2y} = 6 \\ -\cancel{4x} + \cancel{2y} = -6 \\ \hline 0 = 0 \end{array}$$

True, inf. many

$$\begin{aligned} 2x + 6y &= 12 \\ x + 3y &= -9 \end{aligned}$$

$\rightarrow$

$$\begin{array}{r} \cancel{2x} + \cancel{6y} = 12 \\ -\cancel{2x} - \cancel{6y} = 18 \\ \hline 0 = 30 \end{array}$$

False,  $\emptyset$

$$\frac{-2y}{-2} = \frac{-4x + 6}{-2}$$

$$y = 2x - 3$$

$$y = 2x - 3$$

Quiz next

Class over

graphing, subs. & elim.

$$\textcircled{9} \quad \begin{array}{l} 5x + y = 9 \\ 10x - 7y = -18 \end{array} \xrightarrow{\quad} \begin{array}{l} 35x + 7y = 63 \\ 10x - 7y = -18 \\ \hline 45x = 45 \end{array}$$

$$5(1) + y = 9$$

$$5 + y = 9$$

$$y = 4$$

$$\boxed{(1, 4)}$$

$$x = 1$$

$$\textcircled{15} \quad \begin{array}{l} -4x - 15y = -17 \\ -x + 5y = -13 \end{array} \xrightarrow{\quad} \begin{array}{l} -4x - 15y = -17 \\ -3x + 15y = -39 \\ \hline -7x = -56 \end{array}$$

$$\begin{array}{l} -13 + 5y = -13 \\ \hline 5y = 0 \end{array}$$

$$5y = 0$$

$$y = 0$$

$$(8, -1)$$

$$\begin{array}{l} -7x = -56 \\ \hline -7 \end{array}$$

$$x = 8$$

$$\textcircled{17} \quad \begin{array}{l} -7x - 8y = 9 \xrightarrow{9} \\ -4x + 9y = -22 \xrightarrow{8} \end{array} \quad \begin{array}{l} -63x - 72y = 81 \\ -32x + 72y = -176 \\ \hline -95x = -95 \\ \hline -95 \quad \quad -95 \end{array}$$

$$x = 1$$

$$-4(1) + 9y = -22$$

$$\begin{array}{r} \cancel{-4} + 9y = -22 \\ \phantom{\cancel{-4}} + 4 \phantom{=} \phantom{=} \\ \hline \end{array}$$

$$\frac{9}{9}y = \frac{-18}{9}$$

$$y = -2$$

$$(1, -2)$$

$$\textcircled{10} \quad \cancel{2x} + y = 3 - 2x \quad y = \frac{3 - 2x}{1}$$
$$4x = 6 - y$$

$$4x = 6 - (3 - 2x)$$

$$4x = 6 - 3 + 2x$$

$$\begin{array}{r} 4x = 3 + 2x \\ -2x \quad -2x \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{3}{2}$$

$$x = 1.5$$

$$(1.5, 0)$$

$$4(1.5) = 6 - y$$

$$\frac{6 = 6 - y}{-6 = -6 - y}$$

$$\frac{0 = -y}{-1 = -1}$$

$$0 = y$$

20

$$3x - y = x + 2$$

$$-x - 3y = -x + 2$$

$$3x - y = 2$$

$$-x + 3y = 2$$

$\xrightarrow{3}$

$$\begin{array}{r} 3x - y = 2 \\ -3x + 9y = 6 \\ \hline \end{array}$$

$$3x = 1 + 2$$

$$\begin{array}{l} \text{w/} \\ \text{w/} \end{array} x = \begin{array}{l} \text{w/} \\ \text{w/} \end{array} m$$

$$(1, 1)$$

$$\frac{\cancel{8}}{\cancel{8}} y = \frac{\cancel{8}}{\cancel{8}}$$

$$y = 1$$

$$x = 1$$

$$y = \frac{3}{2}x + 1$$

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



$$y = 2x - 2$$

$$y = 2x - 2$$

inf.

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

$$y = 3x + 2$$

$$-3 = x$$

$$\begin{array}{r} 2x - 1 = 3x + 2 \\ -2x \quad -2x \\ \hline -1 = x + 2 \\ -2 \quad -2 \\ \hline -1 = x + 2 \end{array}$$

~~$$y = \frac{3}{2}x + 1$$~~

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

~~$$y = 2x - 2$$~~

~~$$y = 2x - 1 = 3x + 2$$~~