

(b)

graphical method

$$3x + 2y = 7$$

$$9x + 8y = 22$$

x		0		$\frac{7}{3}$	
y		$\frac{7}{2}$		0	

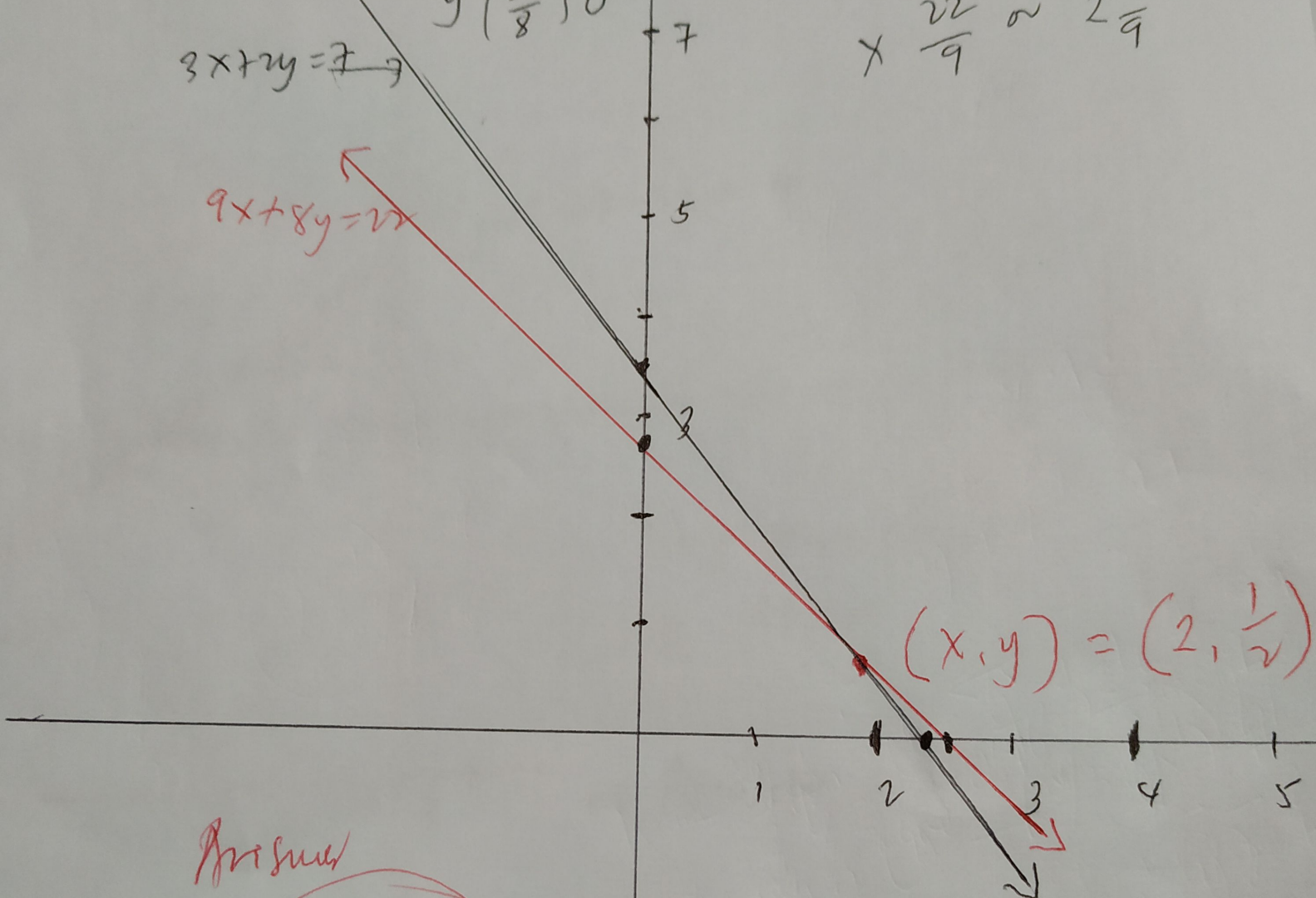
x		0		$\frac{22}{9}$	
y		$\frac{22}{8}$		0	

$\frac{7}{2}$  or  $3\frac{1}{2}$   
 $\frac{7}{3}$  or  $2\frac{1}{3}$

$\frac{22}{8}$  or  $2\frac{3}{4}$   
 $\frac{22}{9}$  or  $2\frac{4}{9}$

~~$3x + 2y = 7$~~

$9x + 8y = 22$



Answer

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

# SOLVING

Using the elimination method, solve each of the following pairs of simultaneous equations:

a) 
$$\begin{array}{r} x + y = 7 \\ x - y = 3 \\ \hline 2x = 10 \\ \frac{2x}{2} = \frac{10}{2} \\ x = 5 \end{array}$$

eliminate x  
← elimination by addition

$$\begin{array}{r} x + y = 7 \\ x - y = 3 \rightarrow -x + y = -3 \\ \hline 2y = 4 \\ \frac{2y}{2} = \frac{4}{2} \\ y = 2 \end{array}$$

eliminate x  
multiply by -1

b) 
$$\begin{array}{r} 5x - 4y = 18 \\ 3x - 2y = 13 \rightarrow \text{multiply by } (-2) \rightarrow -6x + 4y = -26 \\ \hline -x = -8 \\ x = 8 \end{array}$$

eliminate y

eliminate x

$$\begin{array}{r} 5x - 4y = 11 \rightarrow \text{multiply by } 3 \rightarrow 15x - 12y = 33 \\ 3x - 2y = 13 \rightarrow \text{multiply by } (-5) \rightarrow -15x + 10y = -65 \\ \hline -2y = -32 \\ \frac{-2y}{-2} = \frac{-32}{-2} \\ y = 16 \end{array}$$

$$y = \frac{+11}{2}$$

Using the substitution method

$$\begin{aligned} \text{a) } 3x + y &= 17 \quad \rightarrow \quad \cancel{y = 17 - 3x} \\ 3x - y &= 19 \quad \quad y = \underline{3x - 19} \end{aligned}$$

substitute

$$3x + y = 17$$

$$3x + (3x - 19) = 17$$

$$3x + 3x - 19 = 17$$

$$6x = 17 + 19$$

$$\frac{6x}{6} = \frac{36}{6}$$

$$\underline{x = 6}$$

$$y = 3x - 19 ; x = 6$$

$$y = 3(6) - 19$$

$$y = 18 - 19$$

$$\underline{y = -1}$$

$$\text{b) } 2x - y = 3$$

$$\begin{aligned} x + y &= 0 \quad \rightarrow \\ y &= -x \end{aligned}$$

substitute

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

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

$$2x + x = 3$$

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

$$\underline{x = 1}$$

$$y = -x ; x = 1$$

$$\underline{y = -1}$$

Using elimination method and substitution method

a)  $3x - y = -1$

$$x + y = -3$$

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$$4x = -4$$
 elimination by addition

$$x = \frac{-4}{4}$$

$$x = 1$$

but substitution for  $x = 1$

$$x + y = -3$$

$$1 + y = -3$$

$$y = -3 - 1$$

$$y = -4$$

b)

$$2x - 3y = 13$$

$$3x - 12y = 42$$

multiply  
by

(-4)

by elimination

$$\rightarrow -8x + 12y = -52$$

$$\rightarrow 3x - 12y = 42$$

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$$\frac{-5x}{-5} = \frac{-10}{-5}$$

by substitution for  $x = 2$

$$2(2) - 3y = 13$$

$$4 - 3y = 13$$

$$-3y = 13 - 4$$

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

$$y = -3$$

$$x = 2$$

$$x = 2$$