

Solve each system by substitution and write the solution set using proper notation.

$$1. \begin{cases} 2x - 3y = -13 \\ y = 2x + 7 \end{cases} \rightarrow 2x - 3(2x + 7) = -13$$

$$\underline{2x} - \underline{6x} - 21 = -13$$

$$-4x - 21 = -13$$

$$\begin{array}{r} -4x - 21 = -13 \\ +21 \quad +21 \\ \hline -4x = 8 \end{array}$$

Check:

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

$$-4 - 9 = -13$$

$$-13 = -13 \checkmark$$

$$3 = 2(-2) + 7$$

$$3 = -4 + 7$$

$$3 = 3 \checkmark$$

$$\frac{-4x}{-4} = \frac{8}{-4}$$

$$x = -2$$

$$\left\{ \begin{matrix} x & y \\ (-2, & 3) \end{matrix} \right\}$$

$$y = 2x + 7$$

$$y = 2(-2) + 7$$

$$y = -4 + 7$$

$$y = 3$$

$$2. \begin{cases} 2x - y = 4 \\ 3x - 5y = 2 \end{cases}$$

→ solve for y  
look for a coefficient of 1 or -1

$$2x - y = 4$$

$$\underline{-2x} \quad \underline{-2x}$$

$$\frac{-y}{-1} = \frac{-2x + 4}{-1}$$

$$y = \boxed{2x - 4} \rightarrow \text{plug into the 2nd equation}$$

$$3x - 5(2x - 4) = 2$$

$$\underline{3x} - \underline{10x} + 20 = 2$$

$$-7x + 20 = 2$$

$$\begin{array}{r} -7x + 20 = 2 \\ -20 \quad -20 \\ \hline -7x = -18 \end{array}$$

$$\frac{-7x}{-7} = \frac{-18}{-7}$$

$$x = \frac{18}{7}$$

$$y = 2x - 4$$

$$y = \frac{2}{1} \left( \frac{18}{7} \right) - \frac{4}{1}$$

$$= \frac{36}{7} - \frac{28}{7}$$

$$y = \frac{8}{7}$$

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$$\left\{ \left( \frac{18}{7}, \frac{8}{7} \right) \right\}$$

$$3. \begin{cases} 6x + 2y = 7 \\ 3x + y = 2 \end{cases}$$

→ Solve for  $y$

$$3x + y = 2$$

$-3x$

$-3x$

$$y = -3x + 2$$

$$6x + 2(-3x + 2) = 7$$

$$6x - 6x + 4 = 7$$

$$4 = 7$$

No solution

$\emptyset$

$\{ \}$

(~~parallel lines~~)

$$4. \begin{cases} 9x - 3y = 12 \\ y - 3x = -4 \end{cases}$$

$$y - 3x = -4$$

$+3x +3x$

→

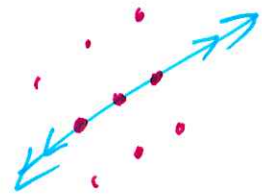
$$y = 3x - 4$$

$$9x - 3(3x - 4) = 12$$

$$9x - 9x + 12 = 12$$

$$12 = 12$$

$$\{(x, y) \mid y = 3x - 4\}$$



5. Discuss and solve the following questions with your group:

a. Do you buy music by digital track or CD?

b. Do you think the sales of digital tracks have exceeded the sales of CD's? If so, in what year do you think that happened. If not, what year will that happen? 2004, 2005

c. Use the mathematical models below to determine when the sales were or will be equal. Find the amount of sales in that year. Answer the questions using complete sentences.

Sales (in millions of \$) of CD albums:  $y = -95x + 770$

Sales (in millions of \$) of Digital Tracks:  $y = 219x + 142$

$x$  represents the number of years after 2004. There is a bar graph in your book on page 299 (Problem 42) if you want a visual representation.

$$\begin{cases} y = -95x + 770 \\ y = 219x + 142 \end{cases}$$

$$x = 2$$

$$\begin{aligned} y &= -95(2) + 770 \\ &= -190 + 770 \\ &= \$580 \text{ million} \end{aligned}$$

$$\begin{array}{r} -95x + 770 = 219x + 142 \\ \quad \quad -142 \qquad \qquad \quad -142 \\ \hline \end{array}$$

$$\begin{array}{r} -95x + 628 = 219x \\ +95x \qquad \qquad \quad +95x \\ \hline \end{array}$$

$$\frac{628}{314} = \frac{314x}{314}$$

$$2 = x$$

$$\hookrightarrow 2004 + 2 = 2006$$

Sales of CD's and digital tracks were the same in 2006. The sales of each were \$580 million.