Section 4.2: The Addition Method

Tuesday, October 22, 2013
9:49 AM

Solve:

$$\begin{cases} 7x - 5y = -1 \\ -3x + 5y = 9 \end{cases}$$ ⇐ ⇙ add

$4x = 8$

$x = 2$

if $a = b$ and $c = d$ then $a + c = b + d$

$7x - 5y = -1$
$7(2) - 5y = -1$
$14 - 5y = -1$
$-5y = -15$
$y = 3$

$\{(2, 3)\}$ independent

Solve

$$\begin{cases} 3x + 4y = -5 \\ 5x + 6y = -7 \end{cases}$$

mult by 5
mult by -3

$15x + 20y = -25$
$-15x - 18y = 21$

$2y = -4$
$y = -2$

$3x + 4(-2) = -5$
$3x - 8 = -5$
$3x = 3$

check:

check:

$5 - 12 = -7$ ✓

$3x = 3$

$x = 1$

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

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solve

$$\begin{cases} 3x + 5y = -11 \\ x - 2y = 11 \end{cases}$$ mult by -3

$3x + 5y = -11$

$-3x + 6y = -33$

$11y = -44$

$y = -4$

$x - 2y = 11$

$x + 8 = 11$

$x = 3$

$\{(3, -4)\}$ independent

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solve:

$$\begin{cases} 5x - 4y = 9 \\ 8y - 10x = -18 \end{cases}$$ mult by 2

$10x - 8y = 18$

$-10x + 8y = -18$

$0 = 0$ same line

$\{(x, y) \mid 5x - 4y = 9\}$

dependent

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solve:

$$\begin{cases} \frac{2}{3}x + \frac{5}{6}y = \frac{1}{4} & \text{mult by } 12 \\ \frac{1}{5}x - \frac{1}{10}y = -\frac{1}{10} & \text{mult by } 10 \end{cases}$$

$$\begin{cases} 8x + 10y = 3 \\ 2x - y = -1 \end{cases} \quad \text{mult by } -4$$

$$\begin{array}{r} 8x + 10y = 3 \\ -8x + 4y = 4 \\ \hline 14y = 7 \end{array}$$

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

$$8x + 10y = 3$$
$$8x + 5 = 3$$
$$8x = -2$$
$$x = -\frac{1}{4}$$

$\{(-\frac{1}{4}, \frac{1}{2})\}$

independent

Wendy has 52 coins consisting of nickels and pennies. If the value of the coins is $1.20, then how many of each type does she have?

let n = number of nickels
p = number of pennies

$$\begin{cases} n + p = 52 & \text{mult by } -1 \\ 5n + p = 120 \end{cases}$$

$$\begin{aligned} -n - p &= -52 \\ 5n + p &= 120 \end{aligned}$$

$$\begin{aligned} 4n &= 68 \\ n &= 17 \end{aligned}$$

$$\begin{aligned} p &= 52 - n \\ &= 35 \end{aligned}$$

Wendy has 17 nickels and 35 pennies.