Solutions for practice in 4.2 Two-Variable Linear Systems of Equations

1. Solve by elimination

We'll eliminate y:

$$2x + 3y = 18$$
$$5x - y = 11 \quad / \cdot 3$$

$$2x + 3y = 18$$
$$15x - 3y = 33 \quad +$$

$$17x = 51 \quad / \div 17$$

$$x = \frac{51}{17}$$

$$x = 3$$

To find y, use $5x - y = 11$

$$y = 5x - 11$$
$$y = 5 \cdot 3 - 11 = 15 - 11 = 4$$

$$\boxed{\begin{array}{l} x = 3 \\ y = 4 \end{array}}$$

2. Solve by elimination

$$\frac{4}{5}x+\frac{3}{5}y=\frac{3}{5} \quad /\cdot 5$$
$$\frac{3}{8}x+\frac{11}{8}y=\frac{23}{8} \quad /\cdot 8$$

I will first simplify both

$$4x+3y=3 \quad /\cdot 3$$
$$3x+11y=23 \quad /\cdot -4$$

$$12x+9y=9$$
$$-12x-44y=-92$$

$$-35y=-83$$
$$y=\frac{83}{35}$$

$$4x+3y=3$$
$$4x=3-3y$$
$$4x=3-3\cdot\frac{83}{35}$$
$$4x=\frac{105-249}{35}$$
$$x=\frac{-144}{4\cdot 35}=-\frac{36}{35}$$

$$x=-\frac{36}{35}$$

$$y=\frac{83}{35}$$

3. $\frac{2}{3}x+\frac{1}{6}y=\frac{2}{3}$ $/\cdot 6$

$4x+y=4$

$4x+y=4$

$4x+y=4$

$\Rightarrow$ Same equation.

Solutions are

$x, y=4-4x$

where x is any real number.

4. $2x - 3y = 8$
$-6x + 9y = 10$

$/ \cdot 3$

$6x - 9y = 24$
$-6x + 9y = 10$

$+$

$0 = 34$

$\downarrow\downarrow$

this system has no solutions

5. Set up and solve (from lecture)

A total of $32,000 is invested in two municipal bonds that pay 5.75% and 6.25% simple interest. The investor wants an annual interest income of $1900 from the investments. What amount should be invested in the 5.75% bond?

x = amount invested @ 5.75%.
y = amount invested @ 6.25%.

$$x + y = 32000 \qquad / \cdot (-0.0625)$$
$$0.0575x + 0.0625y = 1900$$

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we want x, so we'll eliminate y

$$-0.0625x - 0.0625y = -2000$$
$$0.0575x + 0.0625y = 1900$$

$$-0.005x = -100 \qquad / \div -0.005$$

$$x = \frac{100}{0.005} = \frac{100\,000}{5} = 20\,000$$

She should invest $20000 at 5.75%.

6. Set up and solve:

Two sandwiches and a drink cost $4.80. Three sandwiches and three drinks cost $9.90. How much is a sandwich and how much is a drink?

x price of sandwich

y price of drink

$2x+y=4.8$

$3x+3y=9.9 \quad /\div 3$

$2x+y=4.8$

$x+y=3.3 \quad /\cdot(-1)$

$2x+y=4.8$

$-\ x-y=-3.3$

$x=1.5$

Sandwich cost $1.5

$y=3.3-x=3.3-1.5=1.8$

Drink costs $1.8