

②

$$x = -4z - 19$$

$$y = 5x + z - 4$$

$$-5y - z = 25$$

$$-5y - z = 25$$

$$-5(-19z - 99) - z = 25$$

$$95z + 495 - z = 25$$

$$94z = -470$$

$$z = -5$$

$$\rightarrow y = 5(-4z - 19) + z - 4$$

$$y = -20z - 95 + z - 4$$

$$y = -19z - 99$$

$$y = -4$$

$$x = 1$$

$$(1, -4, -5)$$

Applications of 3x3 systems

- ① The sum of three numbers is 12. The first is five times the second and the sum of the first and the third is 9. find the numbers.

$$\begin{aligned}x + y + z &= 12 \\x &= 5y \\x + z &= 9\end{aligned}$$

$$\begin{aligned}y + 9 &= 12 \\y &= 3 \quad x = 15 \\z &= -6\end{aligned}$$

$$\boxed{15, 3, -6}$$

- ② The sum of three numbers is 20. The first number is the sum of the second and the third. The third number is three times the first. Find the numbers

$$\begin{aligned}x + y + z &= 20 \\x &= (y + z) \\z &= 3x\end{aligned}$$

$$\begin{aligned}2x &= 20 \\x &= 10 \\z &= 30 \\y &= -20\end{aligned}$$

③

Billy's Restaurant ordered 200 flowers for Mother's Day. They ordered carnations at \$1.50 each, roses at \$5.75 each, and daisies at \$2.60 each. They ordered mostly carnations, and 20 fewer roses than daisies. The total order came to \$589.50. How many of each type of flower was ordered?

$$C + r + d = 200$$

$$1.5C + 5.75r + 2.6d = 589.50$$

$$r = d - 20$$

$$1.5C + 5.75(d - 20) + 2.6d = 589.50$$

$$1.5C + 5.75d - 115 + 2.6d = 589.50$$

$$C + d - 20 + d = 200$$

$$C + 2d = 220$$

$$1.5C + 8.35d = 704.5$$

$$\cancel{1.5(C + 2d = 220)}$$

$$1.5C + 8.35d = 704.5$$

$$-1.5C - 3d = -330$$

$$5.35d = 374.5$$

$$d = 70$$

$$C = 80$$

$$r = 50$$

80 carnations
50 roses
70 daisies

The Arcadium arcade in Lynchburg, Tennessee uses 3 different colored tokens for their game machines. For \$20 you can purchase any of the following mixtures of tokens: 14 gold, 20 silver, and 24 bronze; OR, 20 gold, 15 silver, and 19 bronze; OR, 30 gold, 5 silver, and 13 bronze. What is the monetary value of each token?

$$\begin{aligned}
 14g + 20s + 24b &= 20 \Rightarrow 7g + 10s + 12b = 10 \\
 20g + 15s + 19b &= 20 \\
 30g + 5s + 13b &= 20
 \end{aligned}$$

① and ③

$$\begin{aligned}
 &-60g + -10s - 26b = -40 \\
 &+ 7g + 10s + 12b = 10 \\
 \hline
 &-53g - 14b = -30 \\
 &\quad \boxed{53g + 14b = 30}
 \end{aligned}$$

② and ③

$$\begin{aligned}
 &20g + 15s + 19b = 20 \\
 &-90g - 15s - 39b = -60 \\
 \hline
 &-70g - 20b = -40 \\
 &\quad \boxed{7g + 2b = 4}
 \end{aligned}$$

$$\begin{array}{r}
 53g + 14b = 30 \\
 -1(7g + 2b = 4) \\
 \hline
 -49g - 14b = -28 \\
 + 53g + 14b = 30 \\
 \hline
 4g = 2 \\
 g = .50
 \end{array}$$

gold \$0.50
 silver \$0.35
 bronze \$0.25

gold tokens are worth \$.50
 silver tokens are worth \$.35
 bronze tokens are worth \$.25

Last Tuesday, Regal Cinemas sold a total of 8500 movie tickets. Proceeds totaled \$64,600. Tickets can be bought in one of 3 ways: a matinee admission costs \$5, student admission is \$6 all day, and regular admissions are \$8.50. How many of each type of ticket was sold if twice as many student tickets were sold as matinee tickets?

$$\begin{aligned}m + s + r &= 8500 \\5m + 6s + 8.5r &= 64,600 \\s &= 2m\end{aligned}$$

5800 regular tickets
1800 student tickets
900 matinee tickets

$$5) \begin{cases} x - y + 4z = 5 \\ 4x + 3y - 2z = 5 \\ 2x + z = 2 \end{cases}$$

$$\begin{array}{r} \rightarrow 3x - 3y + 12z = 15 \\ + 4x + 3y - 2z = 5 \\ \hline 7x + 10z = 20 \end{array}$$

$$(0, 3, 2)$$

$$\begin{cases} 2x + z = 2 \\ 7x + 10z = 20 \end{cases}$$

$$\rightarrow z = 2 - 2x$$

$$\rightarrow 7x + 10(2 - 2x) = 20$$

$$-13x = 0$$

$$x = 0$$

$$z = 2$$

$$0 - y + 8 = 5$$

$$y = 3$$