

8.1 Practice Problems

Solve the following systems by elimination.

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

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

$$x=1$$

Back substitute into either equation

$$\begin{array}{r} 2(1)+y=7 \\ 2+y=7 \\ y=5 \end{array}$$

$$3. \begin{cases} 2x+3y=8 \\ 3x+4y=-5 \end{cases}$$

$$(1) -3(2x+3y) = -3(8)$$

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

$$\begin{array}{r} -6x-9y = -24 \\ + 6x+8y = -10 \\ \hline -y = -34 \\ y = 34 \end{array}$$

$$y=34$$

$$2x+3(34)=8$$

$$2x+102=8$$

$$\frac{2x}{2} = \frac{-94}{2}$$

$$x=-47$$

$$\text{Solution } (-47, 34)$$

$$5. \begin{cases} 3x-2y=8 \\ -6x+4y=-16 \end{cases}$$

$$(1) 2(3x-2y) = 2(8)$$

$$(1) 6x-4y = 16$$

$$(2) -6x+4y = -16$$

$$\begin{array}{r} 0=0 \\ \text{TRUE} \end{array}$$

Infinite solutions

$$\{(x,y) \mid y = \frac{3}{2}x - 4 \text{ and } x \text{ is a real } \neq \}$$

Solve for y

$$3x-2y=8$$

$$\frac{-2y}{-2} = \frac{-3x+8}{-2}$$

$$y = \frac{3}{2}x - 4$$

$$2. \begin{cases} 2x+3y=-9 \\ 4x-y=17 \end{cases}$$

$$(1) -2(2x+3y) = -2(-9)$$

$$(1) -4x-6y = 18$$

$$(2) +4x-y = 17$$

$$\begin{array}{r} -4x-6y = 18 \\ + 4x-y = 17 \\ \hline -7y = 35 \end{array}$$

$$y = -5$$

$$2x+3(-5) = -9$$

$$\begin{array}{r} 2x-15 = -9 \\ +15 \quad +15 \end{array}$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x=3$$

$$\text{Solution } (3, -5)$$

$$4. \begin{cases} 6x-y=-15 \\ 4x+5y=7 \end{cases}$$

$$(1) 5(6x-y) = 5(-15)$$

$$(1) 30x-5y = -75$$

$$(2) 4x+5y = 7$$

$$\begin{array}{r} 30x-5y = -75 \\ + 4x+5y = 7 \\ \hline 34x = -68 \end{array}$$

$$x = -2$$

$$\begin{array}{r} x=2 \\ 6(-2)-y = -15 \\ -12-y = -15 \\ +12 \quad +12 \end{array}$$

$$\begin{array}{r} -y = -3 \\ y = 3 \end{array}$$

$$(-2, 3)$$

$$6. \begin{cases} 4x-y=5 \\ 2y-8x=7 \end{cases}$$

$$(2) -8x+2y=7$$

$$(1) 2(4x-y) = 2(5)$$

$$(1) 8x-2y = 10$$

$$(2) -8x+2y = 7$$

$$0=17$$

False

No Solution

$$\begin{cases} (1) & x+2y = 5 \\ 7. (2) & -3y+5z=9 \\ (3) & 4x - z=1 \end{cases}$$

$$(1) \quad x+2y=5 \\ x = (2y+5)$$

$$(2) \quad -3y+5z=9 \\ \frac{5z}{5} = \frac{+3y+9}{5} \\ z = \frac{+3y+9}{5}$$

Sub these values into the 3rd eq.

$$(3) \quad 4x - z = 1$$

$$4(-2y+5) - (\frac{+3y+9}{5}) = 1$$

$$-8y+20 - \frac{3y}{5} - \frac{9}{5} = 1 \quad \text{clear fractions}$$

$$5(-8y+20 - \frac{3y}{5} - \frac{9}{5}) = 5(1)$$

$$-40y+100+3y-9=5$$

$$-43y+91=5$$

$$\frac{-43y}{-43} = \frac{-86}{-43}$$

$$y=2$$

Solution (1, 2, 3)

$$x = -2(2)+5 \\ = -4+5 \\ x = 1$$

$$z = \frac{3(2)+9}{5} \\ = \frac{6+9}{5} \\ = \frac{15}{5} \\ = 3$$

$$8. \begin{cases} A & x+2y-3z=-16 \\ B & 2x-4y+z=20 \\ C & 3x+5y-2z=-17 \end{cases}$$

After ①

$$\begin{cases} x+2y-3z=-16 \\ -8y+7z=52 \\ -y+7z=31 \end{cases}$$

work to eliminate the x terms from eq B & C

$$-2A+B \rightarrow B$$

$$2A \rightarrow -2x-4y+6z=32$$

$$B \rightarrow \frac{2x-4y+z=20}{-8y+7z=52} \leftarrow \text{The new B}$$

$$-3A+C \rightarrow C$$

$$-3A \rightarrow -3x-6y+9z=48$$

$$C \rightarrow \frac{3x+5y-2z=-17}{-y+7z=31} \leftarrow \text{The new C}$$

② work to eliminate the y term from the C equation

$$-8C+B \rightarrow C$$

$$-8C \rightarrow 8y-56z=-248$$

$$B \rightarrow \frac{-8y+7z=52}{-49z=-196}$$

③ Solve eq C Back sub into others

$$(C) \quad \frac{-49z}{-49} = \frac{-196}{-49} \\ z = 4$$

$$(B) \quad -8y+7(4)=52 \\ -8y+28=52 \\ -8y=24$$

9. A restaurant manager wants to purchase 300 sets of dishes. One design costs \$20 per set, while another costs \$45 per set. If she wants to use her entire budget of \$11,000, how many of each design should be ordered?

$$A \quad x+y=300$$

$$B \quad 20x+45y=11,000$$

$$-20A+B$$

$$-20A \rightarrow -20x-20y=-6000$$

$$B \rightarrow \frac{20x+45y=11000}{25y=5000}$$

$$25y = 5000$$

$$y = 200$$

$$x+y=300 \\ x+200=300 \\ x=100$$

100 sets of \$20 set
200 sets of \$45 set

$$(A) \quad x+2(-3)-3(4)=1$$

$$x-6-12=-16$$

$$x-18=-16 \\ +18 \quad +18$$

$$x=2$$

Solution (2, -3, 4)