

MAC1105
7.1 Practice Problems

Solve the following systems by substitution.

1.
$$\begin{cases} 5x + 6y = 1 \\ y = 3x + 4 \end{cases}$$

$$5x + 6(3x + 4) = 1$$

$$5x + 18x + 24 = 1$$

$$\begin{array}{r} 23x + 24 = 1 \\ -24 \quad -24 \end{array}$$

$$\begin{array}{r} 23x = -23 \\ \frac{23}{23} \quad \frac{-23}{23} \\ x = -1 \end{array}$$

$$\begin{aligned} y &= 3(-1) + 4 \\ &= -3 + 4 \\ &= 1 \end{aligned}$$

$(-1, 1)$
Solution

2.
$$\begin{cases} 7x - 2y = 10 \\ x + 3y = 8 \end{cases}$$

① Solve for one variable

$$x = 8 - 3y$$

② Substitute into other equation

$$7(8 - 3y) - 2y = 10$$

$$56 - 21y - 2y = 10$$

$$\begin{array}{r} 56 - 23y = 10 \\ -56 \quad -56 \end{array}$$

③ Solve

$$\begin{array}{r} -23y = -46 \\ \frac{-23}{-23} \quad \frac{-46}{-23} \end{array}$$

$$y = 2$$

④ Back substitute

$$\begin{aligned} x &= 8 - 3(2) \\ &= 8 - 6 \\ &= 2 \end{aligned}$$

Solution
 $(2, 2)$

Solve the following systems by elimination.

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

① Add

$$\begin{array}{r} 5x = 5 \\ \frac{5}{5} \quad \frac{5}{5} \end{array}$$

② solve

$$x = 1$$

③ Back sub

$$2(1) + y = 7$$

$$2 + y = 7$$

$$\begin{array}{r} -2 \quad -2 \end{array}$$

$$y = 5$$

$(1, 5)$
Solution

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

① Rewrite

$$\begin{array}{r} 2x + 3y = -9 \\ 12x - 3y = 51 \end{array}$$

② Add

$$\begin{array}{r} 14x = 42 \\ \frac{14}{14} \quad \frac{42}{14} \end{array}$$

③ solve

$$x = 3$$

④ Back sub

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

$$\begin{array}{r} 6 + 3y = -9 \\ -6 \quad -6 \end{array}$$

$$\begin{array}{r} 3y = -15 \\ \frac{3}{3} \quad \frac{-15}{3} \end{array}$$

$$y = -5$$

Solution
 $(3, -5)$

mult the equation by 3 so that when you add a variable cancels

Solve the following systems by substitution or elimination.

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

① Rewrite

$$\begin{aligned} -6x - 9y &= -24 \\ 6x + 8y &= -10 \end{aligned}$$

② Add

$$\begin{array}{r} -y = -34 \\ -1 \quad -1 \end{array}$$

③ Solve

$$y = 34$$

Solution
 $(-47, 34)$

④ Back sub

$$\begin{aligned} 2x + 3(34) &= 8 \\ 2x + 102 &= 8 \\ -102 \quad -102 \end{aligned}$$

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

$$x = -47$$

7. $\begin{cases} 3x-2y=8 \leftarrow \text{Mult by } 2 \\ -6x+4y=-16 \end{cases}$

① Rewrite

$$\begin{aligned} 6x - 4y &= 16 \\ -6x + 4y &= -16 \end{aligned}$$

② Add

$$\begin{aligned} 0 + 0 &= 0 \\ 0 &= 0 \end{aligned}$$

TRUE

Solution
 $\{(x, y) \mid 3x - 2y = 8\}$
or
 $\{(x, y) \mid -6x + 4y = -16\}$
or

Solve for y to get

$$\begin{aligned} 3x - 2y &= 8 \\ -3x \quad -3x \\ -2y &= \frac{-3x + 8}{-2} \\ -2 \quad -2 \\ y &= \frac{3}{2}x - 4 \end{aligned}$$

Solution
 $(x, \frac{3}{2}x - 4)$

① Solve for one variable

$$\begin{aligned} 6x - y &= -15 \\ -y &= -6x - 15 \\ y &= 6x + 15 \end{aligned}$$

6.

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

② sub $4x + 5(6x + 15) = 7$

③ solve $4x + 30x + 75 = 7$

$$\begin{aligned} 34x + 75 &= 7 \\ -75 \quad -75 \\ 34x &= -68 \\ 34 \quad 34 \end{aligned}$$

④ Back sub

$$x = -2$$

Solution
 $(-2, 3)$

$$y = 6(-2) + 15$$

$$y = -12 + 15$$

$$y = 3$$

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

$$\begin{aligned} -y &= -4x + 5 \\ y &= 4x - 5 \end{aligned}$$

$$2(4x - 5) - 8x = 7$$

$$8x - 10 - 8x = 7$$

$$-10 = 7$$

FALSE

No Solution