

L10 Solving Linear Systems by Substitution

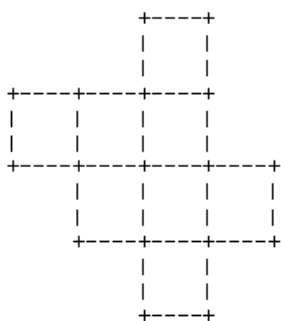
Scheduled Review

The Face Card Problem

Place two Aces, 2 Kings, 2 Queens, and 2 Jacks in the spaces below so that:

- Every Ace borders a King.
- Every King borders a Queen.
- Every Queen borders a Jack.
- No two of the same cards border each other.
- No Ace borders a Queen.

Border means horizontal or vertical.



Review

If $x + y = 22$ what is y if $x = 9$

$$9 + y = 22 \checkmark$$

$$y = 22 - 9 \\ = 13$$

Whenever you use the substitution method to solve systems of equations you must follow the following steps.

1. Isolate one variable in one equation.
2. Substitute the isolated variable into the other equation.
3. Solve the new equation.
4. Use that answer and put it into one of the original equations to solve for the second variable.
5. If a word problem write a sentence. ***Use calc to check***

Eg Solve each of the following by substitution

$$\begin{cases} x + y = 12 \\ 3x + y = 26 \end{cases}$$

Eq 1: Solve for y.

$$x + y = 12$$

$$y = 12 - x$$

Substitution:

$$3x + y = 26$$

$$3x + (12 - x) = 26$$

$$\rightarrow 3x + 12 - x = 26$$

$$2x + 12 = 26$$

$$2x = 26 - 12$$

$$\frac{2x}{2} = \frac{14}{2}$$

$$x = 7$$

Solve for y

$$x + y = 12$$

$$7 + y = 12$$

$$y = 12 - 7$$

$$y = 5$$

$$2x - y = -11$$

$$x + 4y = 17$$

Eq 1

$$2x - y = -11$$

$$-y = -11 - 2x$$

$$y = 11 + 2x$$

Substitute

$$x + 4y = 17$$

$$x + 4(11 + 2x) = 17$$

$$\rightarrow x + 44 + 8x = 17$$

$$9x + 44 = 17$$

$$9x = 17 - 44$$

$$\frac{9x}{9} = \frac{-27}{9}$$

$$x = -3$$

Solve for y

$$2x - y = -11$$

$$2(-3) - y = -11$$

$$-6 - y = -11$$

$$-y = -11 + 6$$

$$-y = -5$$

$$y = 5$$

$$\begin{aligned} 3x + 5y &= 29 \\ 3x - 6y &= -48 \end{aligned}$$

Eqn 2

$$3x - 6y = -48$$

$$\frac{3x}{3} = \frac{-48}{3} + \frac{6y}{3}$$

$$x = -16 + 2y$$

Substitute into Eqn 1

$$3x + 5y = 29$$

$$3(-16 + 2y) + 5y = 29$$

$$-48 + 6y + 5y = 29$$

$$-48 + 11y = 29$$

$$11y = 29 + 48$$

$$\frac{11y}{11} = \frac{77}{11}$$

$$y = 7$$

-

Solve for y

$$3x - 6y = -48$$

$$3x - 6(7) = -48$$

$$3x - 42 = -48$$

$$3x = -48 + 42$$

$$\frac{3x}{3} = \frac{-6}{3}$$

$$x = -2$$