

Finish in class

PAP Algebra 2

Name: _____

HW: System Applications

For #1-2, solve each system of two equations in two variables by hand using substitution.

$$1. \begin{cases} y = -2x^2 + 8x + 1 \\ y = -4x + 19 \end{cases}$$

$$y = -4(3) + 19$$

$$y = -12 + 19$$

$$y = 7$$

$$-4x + 19 = -2x^2 + 8x + 1$$

$$+4x \quad -19 \qquad +4x \quad -19$$

$$0 = -2x^2 + 12x - 18$$

$$\qquad \qquad \qquad -2$$

$$0 = -2(x^2 - 6x + 9)$$

$$0 = -2(x-3)(x-3)$$

$$x = 3$$

$$2. y = x^2 - 7 \text{ and } 2x + y = 8$$

$$\qquad \qquad \qquad -2x \quad / \quad -2x$$

$$8 - 2x = x^2 - 7$$

$$-8 + 2x \qquad \qquad -8$$

$$0 = x^2 + 2x - 15$$

$$0 = (x+5)(x-3)$$

$$x = -5 \qquad x = 3$$

$$y = 18 \qquad y = 2$$

For #3-6, solve each system by matrices.

$$3. \begin{cases} 2x - 3y = 7 \\ y + z = -5 \\ x + 2y + 4z = -17 \end{cases}$$

try By hand
check

$$\begin{bmatrix} 2 & -3 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & 4 \end{bmatrix}^{-1} \begin{bmatrix} 7 \\ -5 \\ -17 \end{bmatrix}$$

(5, 1, -4)

$$5. \begin{cases} x - 4y + 3z = -7 \\ 2x + 3y - 5z = 19 \\ 4x + y - z = 17 \end{cases}$$

$$\begin{bmatrix} 1 & -4 & 3 \\ 2 & 3 & -5 \\ 4 & 1 & -1 \end{bmatrix}^{-1} \begin{bmatrix} -7 \\ 19 \\ 17 \end{bmatrix}$$

(3.5, 1.5, -1.5)

$$4. \begin{cases} 5x + y + 3z = 9 \\ -x - 2y - z = -16 \\ 2x + 4y + 2z = -30 \end{cases}$$

$$\begin{bmatrix} 5 & 1 & 3 \\ -1 & -2 & -1 \\ 2 & 4 & 2 \end{bmatrix}^{-1} \begin{bmatrix} 9 \\ -16 \\ -30 \end{bmatrix}$$

error, no multiples

NO solution

$$6. \begin{cases} 2x - 3z = 4 \\ 2x + y - 5z = -1 \\ 3y - 4z = 2 \end{cases}$$

$$\begin{bmatrix} 2 & 0 & -3 \\ 2 & 1 & -5 \\ 0 & 3 & -4 \end{bmatrix}^{-1} \begin{bmatrix} 4 \\ -1 \\ 2 \end{bmatrix}$$

(17, 14, 10)

For #7, formulate a system of equations for each word problem and solve using matrices.

7. Your school's Key Club decided to sell fruit baskets to raise money for a local charity. The club sold a total of 80 fruit baskets. There were three different types of fruit baskets. Small fruit baskets sold for \$15.75 each, medium fruit baskets sold for \$25 each, and large fruit baskets sold for \$32.50 each. The Key Club took in a total of \$2086.25, and they sold twice as many large baskets as small baskets. How many of each type of basket were sold?

$$S + m + L = 80$$
$$15.75S + 25m + 32.50L = 2086.25$$

$$L = 2S$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 15.75 & 25 & 32.50 \\ -2 & 0 & 1 \end{bmatrix}^{-1} \begin{bmatrix} 80 \\ 2086.25 \\ 0 \end{bmatrix}$$

$$\begin{array}{l} S = 15 \\ m = 35 \\ L = 30 \end{array}$$

For #8, formulate a system of equations for each word problem and solve by hand.

8. The state fair is a popular field trip destination. This year the senior class at High School A and the senior class at High School B both planned trips there. The senior class at High School A rented and filled 8 vans and 8 buses with 240 students. High School B rented and filled 4 vans and 1 bus with 54 students. Every van had the same number of students in it as did the buses. Find the number of students in each van and in each bus.

$$8v + 8b = 240$$

$$4v + 1b = 54$$

$$b = 54 - 4v$$

$$8v + 8(54 - 4v) = 240$$

$$\begin{array}{r} 8v + 432 - 32v = 240 \\ -432 \qquad \qquad -432 \\ \hline -24v = -192 \end{array}$$

$$\begin{array}{r} 4(8) + 1b = 54 \\ -32 \qquad \qquad -32 \\ \hline b = 22 \end{array}$$

$$b = 22$$

$$-24v = -192$$

$$v = 8$$