

## Solving Systems with Matrices Worksheet

Show all work for full credit.

\_\_\_\_\_ Date \_\_\_\_\_

Find the inverse of each matrix, if it exists. No calculator.

$$1) \begin{bmatrix} -2 & 6 \\ -1 & 3 \end{bmatrix}$$

$$2) \begin{bmatrix} 1 & 1 \\ 3 & 4 \end{bmatrix}$$

$$3) \begin{bmatrix} 14 & 8 \\ 6 & 4 \end{bmatrix}$$

Solve for  $X$ .  $2 \times 2$  by hand,  $3 \times 3$  with calculator.

$$4) \begin{bmatrix} 5 & 4 \\ -3 & 2 \end{bmatrix} X = \begin{bmatrix} 10 \\ -16 \end{bmatrix}$$

$$5) \begin{bmatrix} 2 & -1 & 0 \\ 1 & 4 & 2 \\ 3 & -2 & 1 \end{bmatrix} X = \begin{bmatrix} -5 \\ 15 \\ -7 \end{bmatrix}$$

Solve the following systems using matrices. Check your answers. All  $2 \times 2$  systems must be done by hand. Systems  $3 \times 3$  and larger may be solved with a calculator. However, show the matrix equation for all systems.

$$6) \begin{cases} 3x - 7y = 7 \\ 7x + 3y = 3 \end{cases}$$

$$7) \begin{cases} x + 2y = 5 \\ 2x - 5y = -8 \end{cases}$$

$$8) \begin{cases} x + 5y - 10z = 13 \\ 2x - y + 3z = 18 \\ -4x + 6y + 12z = 7 \end{cases}$$

$$9) \begin{cases} -x + z = 6 \\ 4y + 3z = -1 \\ x - y = 0 \end{cases}$$

10) A flower farmer wants to plant three types of bulbs: gladiolas, irises, and tulips. The gladiolas cost \$75 per acre to plant, the irises cost \$100 per acre, and the tulips cost \$50 per acre.

a) The farmer wants to plant 200 acres of bulbs and spend a total of \$15,000. The farmer decides to plant twice as many gladiolas as irises. Write a system of equations and use a matrix to find the total number of acres of each type of flower.

b) The farmer decides to plant 250 acres instead, using the same amount of money. The farmer wants to keep the ratio of gladiolas to irises the same as in part a. Write the matrix equation and find the total number of acres planted of each type of flower.

- 11) Three companies produce three products – tables, lamps, and chairs. In one hour, the first company produces 1 table, 3 lamps, and 2 chairs. In the same amount of time, the second company produces 2 tables, 1 lamp, and 1 chair. The hourly production of the third company is 2 tables, 3 lamps, and 2 chairs.
- a) Find the number of hours that each company needs to operate so their combined production fills an order for 60 tables, 78 lamps, and 56 chairs.
- b) Find the number of hours that each company needs to operate so their combined production fills an order for 42 tables, 52 lamps, and 39 chairs.