S _____ Name: _____

iew 1-3

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the system algebraically.

1) $y = x^3 + x^2$
$y = 4x^2$

$4x^2 = x^3 + x^2$
$-4x^2 \quad -4x^2$
$0 = x^3 - 3x^2$
$0 = x^2(x-3)$

$x=0 \quad y=0$

$x=3 \quad y = 4(3)^2$

$x=3 \quad y=36$

1) _____

2) $y = 5x^2$
$24x + y = 5$

$y = 5 - \frac{1}{25}$

$24x + 5x^2 = 5$
$5x^2 + 24x - 5 = 0$
$(5x - 1)(x + 5) = 0$

$x=-5 \quad y=125$

$x=\frac{1}{5} \quad y=\frac{1}{5}$

* or quad formula

2) _____

Solve the problem.

3) A theatre sells two types of tickets to their plays; children's tickets and adult tickets. For today's performance they have sold a total of 945 tickets. Also, they have sold 4 times as many children's tickets as adult tickets. How many children's tickets have they sold?

$\begin{cases} a + c = 945 \\ c = 4a \end{cases}$

$a + 4a = 945$
$5a = 945$
$a = 189 \quad c = 756$

189 adult tickets
756 childrens tickets

3) _____

Solve.

4) Find the dimensions of a rectangular enclosure with perimeter 40 yd and area 91 yd^2.

$\begin{cases} 2x + 2y = 40 \\ x \cdot y = 91 \end{cases}$ Graph or Algebraically

$x + y = 20$
$x(20 - x) = 91$

13yds by 7yds

4) _____

Find the matrix product, if possible.

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

$r_1 \cdot c_1 = 0 + 3$
$r_1 \cdot c_2 = 2 - 9$
$r_1 \cdot c_3 = -4 + 6$

$r_2 \cdot c_1 = 0 + 2$
$r_2 \cdot c_2 = -6 + -6$
$r_2 \cdot c_3 = 12 + 4$

$\begin{bmatrix} 3 & -7 & 2 \\ 2 & -12 & 16 \end{bmatrix}$

5) _____

6) $\begin{bmatrix} -1 & 3 \\ 1 & 6 \end{bmatrix}\begin{bmatrix} 0 & -2 & 5 \\ 1 & -3 & 2 \end{bmatrix}$

$r_1 \cdot c_1 = 0 + 3$
$r_1 \cdot c_2 = 2 + -9$
$r_1 \cdot c_3 = -5 + 6$
$r_2 \cdot c_1 = 0 + 6$
$r_2 \cdot c_2 = -2 - 18$
$r_2 \cdot c_3 = -5 + 12$

$\begin{bmatrix} 3 & -7 & 1 \\ 6 & -20 & 17 \end{bmatrix}$

6) _____

Determine the value of each variable.

7) $\begin{bmatrix} 7 & 5 & -6 \\ 1 & m & -2 \end{bmatrix} = \begin{bmatrix} x & y & -6 \\ 1 & 8 & -2 \end{bmatrix}$

$x = 7 \quad y = 5 \quad m = 8$

7) _____

Determine whether the matrices are inverses.

8) $\begin{bmatrix} -2 & 4 \\ 4 & -4 \end{bmatrix}, \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$ (A, B)

$A \cdot B = \begin{bmatrix} 1 & .5 \\ 0 & 0 \end{bmatrix}$

they are not inverses since their product is not = to $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

8) _____

Find a row echelon form or a reduced row echelon form, as indicated, for the given matrix.

9) Find a row echelon form for the matrix.

$\begin{bmatrix} 1 & -4 & 5 & -8 \\ -1 & 6 & 7 & 7 \\ -2 & 12 & 16 & -6 \end{bmatrix} \xrightarrow{r_1+r_2} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & -1 \\ -2 & 12 & 16 & -6 \end{bmatrix} \xrightarrow{2R_1+R_3} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & -1 \\ 0 & 4 & 26 & -22 \end{bmatrix}$

9) _____

$\xrightarrow{-2R_2+R_3} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & -1 \\ 0 & 0 & 2 & -20 \end{bmatrix} \begin{matrix} \\ r_2/2 \\ r_3/2 \end{matrix} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 1 & 6 & -\frac{1}{2} \\ 0 & 0 & 1 & -10 \end{bmatrix}$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

10) Suppose that you are solving a system of three linear equations by the row echelon method and obtain the following augmented matrix. 10) A

$\begin{bmatrix} 1 & -4 & 1 & -11 \\ 0 & 1 & -2 & 7 \\ 0 & 0 & 0 & -1 \end{bmatrix}$ ← $0 = -1$ means the system has no solution!

What conclusion can you draw about the solutions of the system?

A) The system has no solutions.

B) The system has exactly one solution.

C) The system has infinitely many solutions.

D) There is not enough information to draw any conclusion about the solutions of the system.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the system of equations by using an inverse matrix.

11) $x - 2y + 3z = 11$
$4x + y - z = 4$
$2x - y + 3z = 10$

$$\begin{bmatrix} 1 & -2 & 3 \\ 4 & 1 & -1 \\ 2 & -1 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 11 \\ 4 \\ 10 \end{bmatrix}$$

$A \cdot X = B$

$X = A^{-1} \cdot B$

$$\begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}$$

11) $(2, -3, 1)$

Use Gaussian elimination to solve the system of equations.

12) $x - y + 4z = -15$
$5x + z = -4$
$x + 5y + z = -9$

$5R_1 + R_3$: $5x - 5y + 20z = -75$
$x + 5y + z = -9$
$6x + 21z = -84$

$-21 \cdot R_2 + R_3$: $-105x - 21z = 84$
$6x + 21z = -84$
$-99x = 0$

$x = 0$ $\quad z = -4$

$x - y + 4z = -15$
$5x + z = -4$
$6x + 21z = -84$

$0 - y + 4(-4) = -15$
$-y - 16 = -15$
$-y = 1$
$y = -1$

12) $(0, -1, -4)$

Solve the system of equations by finding the reduced row echelon form for the augmented matrix.

13) $x + y + z = 7$
$x - y + 4z = 24$
$5x + y + z = 19$

$$\begin{bmatrix} 1 & 1 & 1 & 7 \\ 1 & -1 & 4 & 24 \\ 5 & 1 & 1 & 19 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

13) $(3, -1, 5)$

Solve the system of equations by using an inverse matrix.

14) $-5x + 3y = 8$
$2x - 4y = -20$

$$\begin{bmatrix} -5 & 3 \\ 2 & -4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ -20 \end{bmatrix}$$

$A \cdot X = B$

$$X = A^{-1} \cdot B = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$$

14) $(2, 6)$