

Work each of the following problems as instructed
Algebra 2 TEST 2.2 Review

Name KEY Per _____

State the dimensions and identify the indicated element of each matrix.

1. $\begin{bmatrix} 2 \\ -3 \\ -6 \end{bmatrix}$; a_{21} -3

2. $\begin{bmatrix} 5 & -7 & 23 & 10 \\ -9 & 3 & 5 & -2 \\ 1 & 9 & 0 & 2 \end{bmatrix}$; a_{23} 5

3. $\begin{bmatrix} x & y & z \\ d & e & f \\ p & q & r \end{bmatrix}$; a_{32} q

4. Use the equivalent matrices to solve for each variables.

$$\begin{bmatrix} a & 2b \\ c-2 & d+3 \end{bmatrix} = \begin{bmatrix} 5 & -7 \\ 10 & 10 \end{bmatrix}$$

$$a = 5 \quad 2b = -7$$

$$b = -\frac{7}{2}$$

$$c-2 = 10$$

$$+2 \quad +2$$

$$c = 12$$

$$d+3 = 10$$

$$-3 \quad -3$$

$$d = 7$$

5. a) Rewrite the data from the table in a matrix where the years are the rows and the categories are the columns.

Unemployment Rates		
	June 1992	June 1996
Construction	17.6%	9.5%
Manufacturing	8.3%	5.1%
Transportation	5.4%	4.5%
Sales	8.7%	6.4%
Finance	4.0%	2.6%
Services	6.6%	5.1%
Government	3.5%	2.7%

$$\begin{bmatrix} 17.6 & 8.3 & 5.4 & \dots \\ 9.5 & 5.1 & 4.5 & \dots \end{bmatrix}$$

(b) Identify a_{21} and what it represents. 9.5

(c) Identify a_{16} and what it represents. 6.6

Solve each matrix.

6. $X - \begin{bmatrix} 0 & 0 & 1 \\ 1 & -2 & -2 \\ -2 & -3 & 3 \end{bmatrix} = \begin{bmatrix} 3 & 12 & 1 \\ -6 & -4 & 2 \\ -3 & 6 & 7 \end{bmatrix} + \begin{bmatrix} 0 & 0 & 1 \\ 1 & -2 & -2 \\ -2 & -3 & 3 \end{bmatrix}$

$$X = \begin{bmatrix} 3 & 12 & 2 \\ -5 & -6 & 0 \\ -5 & 3 & 10 \end{bmatrix}$$

7. Are these matrices inverses of each other.

$$\begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix} \begin{bmatrix} 4 & -1.5 \\ -1 & .5 \end{bmatrix}$$

$$A \cdot B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \text{ yes}$$

Use the provided matrices to find the following, if possible. You may use your graphing calculator.

$$A = \begin{bmatrix} 1 & -1 \\ 3 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 2 \\ -2 & 1 \\ -1 & 0 \end{bmatrix} \quad C = \begin{bmatrix} 3 & -3 & -1 \\ 2 & -2 & 4 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 3 \\ -3 \\ 2 \end{bmatrix} \quad F = \begin{bmatrix} 10 & -1 \\ 0 & 2 \\ -3 & 5 \end{bmatrix}$$

8. AB
 $2 \times 2 \times 3 \times 2$
N.P.

9. $B-3F$

$$\begin{bmatrix} -30 & 5 \\ -2 & -5 \\ 8 & -15 \end{bmatrix}$$

10. EC

$$3 \times 1 \cdot 2 \times 3$$

N.P.

11. $CB-5A$

$$\begin{bmatrix} 2 & 8 \\ -15 & 12 \end{bmatrix}$$

12. AD by hand

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

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

Work each of the following problems as instructed

13. mult. by hand $\begin{bmatrix} x & a \\ b & y \end{bmatrix} \begin{bmatrix} 4 & -1 \\ -3 & 2 \end{bmatrix}$ $\begin{bmatrix} 4x-3a & -x+2a \\ 4b-3y & -b+2y \end{bmatrix}$	14. find the missing matrix $\begin{bmatrix} 3 & -5 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} ? & ? \\ ? & ? \end{bmatrix} = \begin{bmatrix} 3 & -5 \\ 2 & 1 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$	15. What is the new size of CE $2 \times 3 \cdot 3 \times 1$ 2×1	16. What is the identity matrix of a 3×3 ? $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$	17. Find the Determinant $\begin{bmatrix} x & a \\ b & y \end{bmatrix} xy - ab$
---	--	--	--	--

Find the determinant and inverse of each matrix, if it exists. 18 by hand and 19 using the calculator

18. $\begin{bmatrix} 6 & 2 \\ 2 & 1 \end{bmatrix}$ $6 \cdot 1 - 2 \cdot 2 = 6 - 4 = 2 \text{ Det}$ $\frac{1}{2} \begin{bmatrix} 1 & -2 \\ -2 & 6 \end{bmatrix} = \begin{bmatrix} \frac{1}{2} & -1 \\ -1 & 3 \end{bmatrix}$	19. $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 1 & -2 \\ -1 & 2 & 1 \end{bmatrix}$ Det = 10 $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \\ \frac{1}{5} & 0 & \frac{1}{5} \\ \frac{1}{10} & -\frac{1}{2} & \frac{1}{10} \end{bmatrix}$
--	---

Solve for matrix X. Use inverse matrices on the calculator

20. $\begin{bmatrix} 3 & 5 \\ 6 & 2 \end{bmatrix} X = \begin{bmatrix} -2 & 6 \\ 4 & 12 \end{bmatrix}$ $A \quad B \quad X = A^{-1} \cdot B$ $X = \begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}$	21. $\begin{bmatrix} 1 & 1 & -1 \\ 0 & 2 & -1 \\ 1 & 3 & 0 \end{bmatrix} X = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}$ $A \quad B \quad X = A^{-1} \cdot B$ $X = \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix}$
22. Write as a matrix equation. Then solve by inverse matrices. $3x + 5y = 4$ $2x - 7y = 13$ $\begin{bmatrix} 3 & 5 \\ 2 & -7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 13 \end{bmatrix}$ $A \quad X \quad B$ $A^{-1} \cdot B = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$ $(3, -1)$	23. Write as a matrix equation. Then solve by inverse matrices. $\begin{cases} 3x - y + 2z = 4 \\ x + 5z = -13 \\ 2x + 2y - z = -1 \end{cases}$ $\begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & 5 \\ 2 & 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ -13 \\ -1 \end{bmatrix}$ $A \quad X \quad B$ $A^{-1} \cdot B = \begin{bmatrix} 2 \\ -4 \\ -3 \end{bmatrix}$ $(2, -4, -3)$

24. Write a system of equations, then write a matrix equation to solve.

$x = \text{yellow chalk}$ $y = \text{white}$

On Monday, Mr. Graff bought 8 packs of yellow chalk and 4 packs of white chalk for \$7.40.
 On Tuesday, Mrs. Graff went to the same store and bought 6 packs of yellow and 12 packs of white chalk for \$10.50. How much does each type of chalk cost?

$$\begin{aligned} 8x + 4y &= 7.40 \\ 6x + 12y &= 10.50 \end{aligned}$$

$$\begin{bmatrix} 8 & 4 \\ 6 & 12 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7.4 \\ 10.5 \end{bmatrix}$$

$$x = .65 \quad y = .55$$

25.

Jenny has 10 fewer quarters than dimes and five fewer nickels than quarters. The total value of the coins is \$4.75. Write a system of 3 equations and solve for the number of nickels, dimes, and quarters Jenny has in her possession.

$$5n + 10d + 25q = 475$$

$$d - q = 10$$

$$-n + q = 5$$

$$(5, 20, 10)$$

$$\begin{bmatrix} 5 & 10 & 25 \\ 0 & 1 & -1 \\ -1 & 0 & 1 \end{bmatrix} \begin{bmatrix} n \\ d \\ q \end{bmatrix} = \begin{bmatrix} 475 \\ 10 \\ 5 \end{bmatrix}$$

$$N = 5 \quad 20 = D \quad Q = 10$$

Work each of the following problems as instructed

Solve the following system of equations using elimination and substitution. SHOW YOUR WORK.

26. $3a - 2b + 4c = 35$

$-4a + b - 5c = -36 \quad \times 2 \quad \times 3$

$5a - 3b + 3c = 31$

27. $-4x - 2y - z = 15 \quad \times 3 \quad \times 7$

$12x + 6y + 3z = 45$

$2x + 5y + 7z = -29$

$3a - 2b + 4c = 35$

$-8a + 2b - 10c = -72$

$-5a - 6c = -37 \quad \times -2$

$-12a + 3b - 15c = -108$

$5a - 3b + 3c = 31$

$-7a - 12c = -77$

$10a + 12c = 74$

$-7a - 12c = -77$

$3a = -3$

$a = -1$

$-5(-1) - 6c = -37$

$5 - 6c = -37$

$-5 \quad -5$

$-6c = -42$

$c = 7$

$3(-1) - 2b + 4(7) = 35$

$-3 - 2b + 28 = 35$

$-2b + 25 = 35$

$-25 \quad -25$

$(-1, -5, 7)$

$-2b = 10$

$b = -5$

$-12x - 6y - 3z = 45$

$12x + 6y + 3z = 45$

$0 = 0$

$-28x - 14y - 7z = 105$

$2x + 5y + 7z = -29$

$-26x - 9y = 76 \quad F$

No Sol.