Precalculus Name : _____

Chapter 8 Quiz Review Worksheet Date: _____ Hour: ____

Show all work on a separate sheet of lined paper for full credit.

Section A ALL

Write the dimensions of each matrix. Identify the indicated element.

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

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

3. $\begin{bmatrix} 2 & 3 & -9 \\ 12 & -8 & 0 \end{bmatrix}; a_{21}$

4. $\begin{bmatrix} x & y & z \\ a & b & c \\ p & q & r \end{bmatrix}; a_{32}$

5. $\begin{bmatrix} 2 & -2 \\ 3 & -3 \\ 4 & -4 \end{bmatrix}; a_{31}$

6. $[5 \quad 8 \quad -7 \quad -4]; a_{14}$

Use the table for Exercises 7–10.

Unemployment by Category

	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%

Source: *U.S. News & World Report*

7. Display the data in a matrix with the types of unemployment in the columns.
8. State the dimensions of the matrix.
9. Identify a_{21}, and tell what it represents.
10. Identify a_{16}, and tell what it represents.

Use the table at the right for Exercises 11–14.

Source: *U.S. News & World Report*

11. Write a matrix M to represent the data in the graph, with columns representing years.
12. What are the dimensions of this matrix?
13. What does the first row represent?
14. What does m_{32} represent?

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Section B ALL

Find the value of each variable.

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

2. $\begin{bmatrix} 3 & 5 & -y & x \\ z & 0 & 3a & b \end{bmatrix} = \begin{bmatrix} 3 & 3c & 7 & 4 \\ \frac{7}{2} & 0 & -9 & 3b \end{bmatrix}$

3. $\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix} + \begin{bmatrix} 2 & -13 \\ -10 & -10 \end{bmatrix} = \begin{bmatrix} 2x+1 & -4x \\ 5z & 2.5z - x \end{bmatrix}$

Use the information in the table.

Club Membership at TC High School

	1961–1962		2001–2002	
	Males	Females	Males	Females
Beta	37	23	56	58
Spanish	0	93	76	82
Chess	87	0	102	34

4. Put the data in two matrices: one for males and one for females.
5. Use matrix subtraction to find the difference between the number of males and the number of females in each club

Find each sum or difference.

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

7. $\begin{bmatrix} 8 & -5 & -5 \\ 4 & -10 & 10 \\ 2 & -15 & -15 \end{bmatrix} - \begin{bmatrix} 0 & 0 & 1 \\ 1 & -2 & -2 \\ -2 & -3 & 3 \end{bmatrix}$

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

9. $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + \begin{bmatrix} -1 \\ -3 \\ 5 \end{bmatrix} + \begin{bmatrix} -10 \\ -7 \\ 11 \end{bmatrix} - \begin{bmatrix} -3 \\ -5 \\ -6 \end{bmatrix}$

Solve each matrix equation.

10. $X - \begin{bmatrix} 3 & 4 \\ 4 & 2 \\ 1 & 9 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 12 \\ 3 & 2 \end{bmatrix}$

11. $X + \begin{bmatrix} 20 & -9 & -3 \\ 19 & -2 & -5 \\ -1 & 0 & -8 \end{bmatrix} = \begin{bmatrix} -7 & 92 & -5 \\ 0 & 91 & -6 \\ -9 & -1 & 12 \end{bmatrix}$

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

13. $\begin{bmatrix} 2 & 2 & 0 \\ 1 & -1 & -1 \end{bmatrix} = \begin{bmatrix} 2 & -2 & 3 \\ -3 & -3 & 4 \end{bmatrix} - X$

Determine whether the two matrices in each pair are equal. Justify your reasoning.

14. $\begin{bmatrix} 2 \\ \sqrt{9} \\ 16 \end{bmatrix}; \begin{bmatrix} \frac{4}{2} & 3 & 4^2 \end{bmatrix}$

15. $\begin{bmatrix} 2(3) & 3(1.5) \\ 7 & \frac{10}{2} \end{bmatrix}; \begin{bmatrix} 6 & 4.5 \\ 7 & 5 \end{bmatrix}$

ction C 1-19odd, 21-31all

Use matrices A, B, C, D, and E to find each product, sum, or difference, if possible. If not possible, write *product undefined*, *sum undefined*, or *difference undefined*.

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

1. $3AB$
2. $2A + 4D$
3. $5D - A$
4. $2C - E$
5. $3D + A$
6. DA
7. AE
8. BD
9. DB
10. CE
11. DC
12. EB
13. CB
14. $2D$
15. BE
16. $0.2B$
17. $\frac{1}{4}C$
18. $0.5AC$
19. DE
20. $-3DE$

Find the dimensions of the product matrix. Then find each product.

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

22. $\begin{bmatrix} 1 & 2 & 12 \\ 12 & 2 & 1 \end{bmatrix}\begin{bmatrix} 3 & 4 \\ 4 & 3 \\ 5 & 2 \end{bmatrix}$

23. $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

Find each product if possible. If not possible, write *product undefined*.

24. $-12\begin{bmatrix} -6 & -2 \\ -5 & -6 \\ 0 & 1 \end{bmatrix}$

25. $\begin{bmatrix} 3 & 2 \\ 4 & 6 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} -3 & 3 & -2 \\ -2 & 5 & -1 \end{bmatrix}$

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

27. $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} 2 & 3 \\ 4 & 1 \\ 5 & 6 \end{bmatrix}$

28. $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} 6 & 4 & 2 & 8 \\ 10 & 4 & 6 & 2 \\ 2 & 10 & 12 & 4 \end{bmatrix}$

29. $\begin{bmatrix} 4 & 3 \\ 9 & 7 \end{bmatrix}\begin{bmatrix} 6 & 3 \\ 9 & 4 \end{bmatrix}$

Solve each equation. Check your answers.

30. $2\begin{bmatrix} 0 & 1 \\ 3 & -4 \end{bmatrix} - 3X = \begin{bmatrix} 9 & -6 \\ 1 & -2 \end{bmatrix}$

31. $\frac{1}{2}X + \begin{bmatrix} 5 & -1 \\ 0 & \frac{2}{3} \end{bmatrix} = 2\begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$

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Section D

1-6 all, 9-14 all

Write a system of equations for each augmented matrix.

1. $\left[\begin{array}{cc|c} 4 & -2 & 3 \\ 6 & 11 & 9 \end{array}\right]$

2. $\left[\begin{array}{cc|c} 12 & 6 & -4 \\ -1 & 0 & 2 \end{array}\right]$

3. $\left[\begin{array}{ccc|c} -2 & 9 & -2 & 20 \\ 3 & -1 & 2 & 29 \\ 6 & 5 & 5 & -4 \end{array}\right]$

Solve the system of equations using an augmented matrix and Gaussian Elimination.

4. $\begin{cases} 2x + y = 1 \\ 3x - y = 9 \end{cases}$

5. $\begin{cases} 2x - y = 10 \\ x - 3y = 0 \end{cases}$

6. $\begin{cases} 3x + 5y = 1 \\ x + 6y = 9 \end{cases}$

7. $\begin{cases} x + y + z = 1.28 \\ x - 3y + 2z = 1.26 \\ 3x + 2y + 4z = 4.06 \end{cases}$

8. $\begin{cases} 2x + y - z = 0.75 \\ 3x + 3y + 2z = 4 \\ x - 5y + 3z = -2 \end{cases}$

9. $\begin{cases} x + y - z = 6 \\ 3x - 9y + z = -2 \\ 0.2x - 0.3y + 0.71z = -1.1 \end{cases}$

Write an augmented matrix for each system.

10. $\begin{cases} -3x + 4y = -8 \\ 2x - 8y = 16 \end{cases}$

11. $\begin{cases} u + 3v = -30 \\ 4u + v = 1 \end{cases}$

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

Use an augmented matrix to solve each system.

13. $\begin{cases} x + y + z = 0 \\ 2x - 2y + 3z = 46 \\ 3x + 7y + 11z = 80 \end{cases}$

14. $\begin{cases} 3x + y + z = 18 \\ 4x + 2y + 3z = 12 \\ 7x + 8y + 5z = 9 \end{cases}$

15. $\begin{cases} 3x + 7y + 10z = 28 \\ 0.7x - 0.6y + 0.8z = 4.3 \\ 12x - 7y - 9z = 77 \end{cases}$

16. $\begin{cases} x - 2y - 3z = 2 \\ 2x + y - 5z = 30 \\ 7x - 11y - z = -48 \end{cases}$

17. $\begin{cases} x + y + z = 6.5 \\ 3x - 5y + 6z = -35 \\ 5x + 2y + 2z = 10 \end{cases}$

18. $\begin{cases} -x + y - z = -2 \\ 3x + 2y + 0.5z = -1.5 \\ 21x + 19y - 2z = -45 \end{cases}$

Use a graphing calculator to solve each system.

19. $\begin{cases} 4x - 2y + 3z = -2 \\ 2x + 2y + 5z = 16 \\ 8x - 5y - 2z = 4 \end{cases}$

20. $\begin{cases} x + y + z = -1 \\ 3x + 5y + 4z = 2 \\ 3x + 6y + 5z = 0 \end{cases}$

21. $\begin{cases} x + 3y - 2z = -3 \\ 2x + y - z = -6 \\ 3x - 2y + 4z = 8 \end{cases}$