

Quiz: Matrices, Part I
Mr. Chvatal

Name: _____ **Date:** _____

Questions #1-10 are to be completed without the aid of a calculator. When you have completed these problems, turn it in to receive the rest of the test. You may then use a calculator for the remainder of the test. You may not begin the remainder of the test until questions #1-10 are complete. Please show all work.

Questions 1-6 refer to the matrices below.

$$A = \begin{pmatrix} 2 & 6 & 8 \\ -7 & 11 & -6 \\ 4 & 1 & -5 \end{pmatrix} \quad B = \begin{pmatrix} 9 & 8 \\ 5 & 3 \\ -2 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 0 & 1 & -4 \\ -4 & 6 & 3 \end{pmatrix} \quad D = \begin{pmatrix} 2 & -6 & 1 \\ -9 & 3 & 5 \\ 11 & 5 & 5 \end{pmatrix}$$

1. What are the dimensions of these matrices?

A B C D

2. Determine the value of the following entries:

$$a_{12} = \quad b_{32} = \quad c_{21} = \quad d_{13} = \quad c_{32} =$$

Please find the resulting matrices. Show all work.

3. $D - A$

4. BC

5. $-3C$

6. A^2

7. Demonstrate that matrices A and B **are or are not** inverses of each other. Show all work.

$$A = \begin{pmatrix} 7 & 6 \\ 9 & 8 \end{pmatrix} \qquad B = \begin{pmatrix} 4 & -3 \\ -\frac{9}{2} & \frac{7}{2} \end{pmatrix}$$

8. Determine if each of the matrices below has an inverse by finding the determinate.

$$A = \begin{bmatrix} -4 & 6 \\ -10 & 15 \end{bmatrix} \qquad D = \begin{bmatrix} -3 & 2 & 9 \\ -7 & 1 & 2 \\ -4 & 8 & 11 \end{bmatrix}$$

9. Solve for z using Cramer's Rule:
$$\begin{cases} 2x + y + z = 1 \\ x - y + 4z = 0 \\ x + 2y - 2z = 3 \end{cases}$$

10. If $W = \begin{pmatrix} 2 & 3 \\ -4 & 6 \end{pmatrix}$ and $2W - 3Z = \begin{pmatrix} 7 & -3 \\ -29 & -3 \end{pmatrix}$, find Z . Show all work.

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Rewrite the following systems of equations as matrix equations of the form $Ax = B$, then solve using a graphing calculator.

11.
$$\begin{cases} -3x + 9y = 1 \\ 4x - 12y = -3 \end{cases}$$

12.
$$\begin{cases} 3x - 4y - z = 29 \\ 3z - x = 5 \\ 2x + 6y + z = 0 \end{cases}$$

Solve using matrices. Show all work.

13. There are three classes of salt. Chiang Kai-Shek has 31 measures composed of one of the second class and two of the third class. Mao Zedong has four bundles of the first, two of the second and one of the third. Sun Yat-Sen has six bundles of the first and two of the third. Mao Zedong has seven more measures than Chiang Kai-Shek and four less than Sun Yat-Sen. How many measures of salt are contained in one bundle of each class?

Bonus: Which of these three famous Chinese leaders actually came from a family of salt merchants (and led the Republic of China on the island of Taiwan)?