Matrix Algebra Practice Questions

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These matrix algebra practice questions have been provided for your benefit and are intended solely for practice purposes. Completion of these exercises does not contribute to your overall grade; rather, they are designed to reinforce your understanding of the subject matter and enhance your proficiency in matrix algebra.

Q1: Write a column vector with 4 entries whose entries add to zero.

Q2: Let

$$\mathbf{u} = \begin{bmatrix} 1 \\ -2 \end{bmatrix} \mathbf{v} = \begin{bmatrix} 2 \\ -5 \end{bmatrix} \mathbf{w} = \begin{bmatrix} -6 \\ 0 \end{bmatrix} \tag{1}$$

Solve the following:

u + v

u + v + w

u - w

3 * v

2 / w

3*(u + v)

Q3: What are dimensions of the following matrices?

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

$$\begin{bmatrix} 1 & 4 & 3 \\ 0 & -2 & 2 \\ 1 & -3 & -9 \\ -2 & 7 & 3 \\ 4 & -1 & 7 \end{bmatrix} \tag{3}$$

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

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

Q4: Multiply the following matrices:

$$\mathbf{XY} = \begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix} \begin{bmatrix} 3 & -1 \\ 2 & -2 \end{bmatrix} \tag{6}$$

Q5: Find the inverse using row operations (hint: you need to google this):

$$\begin{bmatrix} 3 & -1 \\ 2 & -2 \end{bmatrix} \tag{7}$$

Q6: Write the transpose (A^T) of the following matrix using row operations:

$$\mathbf{A} = \begin{bmatrix} 3 & -1 & 1 \\ 2 & -2 & 5 \\ 4 & 3 & 2 \end{bmatrix} \tag{8}$$

Q7: Find the following matrix products.

$$\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -1 \end{bmatrix} \tag{9}$$

$$\begin{bmatrix} 1 & 2 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \tag{10}$$

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 2 & 3 \end{bmatrix} \tag{11}$$

Q8: Give an example of diagonal matrix, square matrix, symmetric matrix, identity matrix.

Diagonal matrix :

Square matrix :

Symmetric matrix :

Identity matrix :