

Linear Algebra

TOTAL POINTS 5

1.Question 1

Let two matrices be

$$A = \begin{bmatrix} 4 & 6 & 3 & 9 \end{bmatrix}, B = \begin{bmatrix} -2 & -5 & 9 & 2 \end{bmatrix}$$

What is $A - B$?



$$\begin{bmatrix} 2 & 1 & -6 & 7 \end{bmatrix}$$



$$\begin{bmatrix} 4 & 1 & 1 & 2 & 1 & 1 \end{bmatrix}$$



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



$$\begin{bmatrix} 6 & 1 & 1 & -1 & 2 & 1 & 1 \end{bmatrix}$$

Correct

To subtract B from A, carry out the subtraction element-wise.

1 / 1 point

2.Question 2

Let $x = \begin{bmatrix} 1 & 1 & 1 & 8 & 2 & 5 & 1 & 1 & 1 & 1 \end{bmatrix}$

What is $2 * x$?



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



$$\begin{bmatrix} 1 & 1 & 1 & 1 & 6 & 4 & 1 & 0 & 2 & 1 & 1 & 1 \end{bmatrix}$$



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



[164102]

Correct

To multiply the vector x by 2, take each element of x and multiply that element by 2.

1 / 1 point

3.Question 3

Let u be a 3-dimensional vector, where specifically

$$u = \begin{bmatrix} 2 \\ 1 \\ 8 \end{bmatrix}$$

What is $u^T u$?



$$\begin{bmatrix} 8 \\ 1 \\ 2 \end{bmatrix}$$



$$[812]$$



$$\begin{bmatrix} 2 \\ 1 \\ 8 \end{bmatrix}$$



$$[218]$$

Correct

1 / 1 point

4.Question 4

Let u and v be 3-dimensional vectors, where specifically

$$u = \begin{bmatrix} 3 \\ -5 \\ 4 \end{bmatrix}$$

and

$$v = \begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix}$$

What is $u^T v$?

(Hint: $u^T u$ is a

1x3 dimensional matrix, and v can also be seen as a 3x1

matrix. The answer you want can be obtained by taking

the matrix product of $u^T u$ and $v v^T$.) Do not add brackets to your answer.

13

Correct

1 / 1 point

5.Question 5

Let A and B be 3x3 (square) matrices. Which of the following

must necessarily hold true? Check all that apply.

☐

$$A * B = B * A$$

☐

If $C = A * B$, then C is a 6x6 matrix.

☐

$$A + B = B + A$$

Correct

We add matrices element-wise. So, this must be true.

☐

If A is the 3x3 identity matrix, then $A * B = B * A$

Correct

Even though matrix multiplication is not commutative in general ($A * B \neq B * A$ for general matrices A, B), for the special case where $A = I$, we have $A * B = I * B = B$, and also $B * A = B * I = B$. So, $A * B = B * A$.