Linear Algebra

Practice Quiz, 5 questions

5/5 points (100%)

✔ Congratulations! You passed!

Next Item

Question Responses

- ✔ Question 1
- ✔ Question 2
- ✔ Question 3
- ✔ Question 4
- ✔ Question 5

Review Materials

- **Matrix Multiplication Properties**
- **Inverse and Transpose**
- **Matrix Matrix Multiplication**
- **Addition and Scalar Multiplication**
- **Matrix Vector Multiplication**

✔ 1 / 1 points

Concepts

★ Compute the result of adding two matrices together

Addition and Scalar Multiplication (00:11)

1.

Let two matrices be

$$A = \begin{bmatrix} 1 & -4 \\ -2 & 1 \end{bmatrix}, \qquad B = \begin{bmatrix} 0 & 3 \\ 5 & 8 \end{bmatrix}$$

What is A + B?

- ○ $\begin{bmatrix} 1 & 7 \\ 7 & 9 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & -7 \\ -7 & -7 \end{bmatrix}$
- ✔ $\begin{bmatrix} 1 & -1 \\ 3 & 9 \end{bmatrix}$

Correct
To add two matrices, add them element-wise.

5/5 points (100%)

$\begin{bmatrix} 1 & -1 \\ 7 & 9 \end{bmatrix}$

1 / 1 points

Concepts

★ Compute the result of multiplying a matrix by a scalar number
Addition and Scalar Multiplication (01:54)

2.

Let $x = \begin{bmatrix} 2 \\ 7 \\ 4 \\ 1 \end{bmatrix}$

What is $3 * x$?

$\begin{bmatrix} \frac{2}{3} \\ \frac{7}{3} \\ \frac{4}{3} \\ \frac{1}{3} \end{bmatrix}$

$\begin{bmatrix} \frac{2}{3} & \frac{7}{3} & \frac{4}{3} & \frac{1}{3} \end{bmatrix}$

$\begin{bmatrix} 6 \\ 21 \\ 12 \\ 3 \end{bmatrix}$

Correct
To multiply the vector x by 3, take each element of x and multiply that element by 3.

$\begin{bmatrix} 6 & 21 & 12 & 3 \end{bmatrix}$

Concepts

★ Compute the transpose of a matrix

Inverse and Transpose (07:34)

3.

Let u be a 3-dimensional vector, where specifically

$$u = \begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix}$$

What is u^{T}?

- $\begin{bmatrix} 4 & 1 & 8 \end{bmatrix}$
- $\begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix}$
- ✓ $\begin{bmatrix} 8 & 1 & 4 \end{bmatrix}$

Correct

- $\begin{bmatrix} 4 \\ 1 \\ 8 \end{bmatrix}$

✓ 1 / 1
points

Concepts

★ Compute the result of multiplying a matrix by a vector

Matrix Vector Multiplication (00:13)

5/5 points (100%)

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

$$u = \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$$

and

$$v = \begin{bmatrix} 2 \\ 2 \\ 4 \end{bmatrix}$$

What is $u^T v$?

(Hint: u^T is a

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

matrix. The answer you want can be obtained by taking

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

4

Correct Response

1 / 1 points

Concepts

- Compute the result of multiplying a matrix by a matrix
  - **Matrix Matrix Multiplication (00:28)**
- Recognize that matrix matrix multiplication is not commutative
  - **Matrix Multiplication Properties (00:18)**
- Define the identity matrix
  - **Matrix Multiplication Properties (04:50)**

5.

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Let A and B be 3x3 (square) matrices. Which of the following must necessarily hold true? Check all that apply.

- [x] $A + B = B + A$

Correct

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

- [x] 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, $A * B = B * A$.

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

Un-selected is correct

- [ ] $A * B = B * A$

Un-selected is correct