Linear Algebra Quiz PDF

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Which operation is not defined for vectors?

- ◯ Addition
- ◯ Scalar multiplication
- ◯ Division
- ◯ Dot product

Which of the following matrices is an identity matrix?

- ◯ \(\begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}\)
- ◯ \(\begin{matrix} 0 & 1 \\ 1 & 0 \end{matrix}\)
- ◯ \(\begin{matrix} 1 & 1 \\ 1 & 1 \end{matrix}\)
- ◯ \(\begin{matrix} 0 & 0 \\ 0 & 0 \end{matrix}\)

What is the rank of a zero matrix?

- ◯ 0
- ◯ 1
- ◯ Depends on the size of the matrix
- ◯ Infinity

Explain how linear algebra is utilized in machine learning algorithms.

What are the conditions under which a matrix is invertible?

Explain the significance of the rank-nullity theorem in linear algebra.

Which of the following is a necessary condition for a matrix to be invertible?

- ◯ It must be a square matrix.
- ◯ It must be a diagonal matrix.
- ◯ It must be a symmetric matrix.
- ◯ It must be a zero matrix.

Describe the process of the Gram-Schmidt orthogonalization and its purpose.

Which of the following are true about eigenvectors?

- ☐ They are always non-zero.
- ☐ They can be scaled by any non-zero scalar.
- ☐ They are orthogonal to each other.
- ☐ They correspond to eigenvalues.

Which matrices are diagonalizable?

- [ ] Identity matrix
- [ ] Zero matrix
- [ ] Any square matrix
- [ ] Symmetric matrix

Which of the following are applications of linear algebra?

- [ ] Computer graphics
- [ ] Quantum mechanics
- [ ] Financial modeling
- [ ] Language processing

How do eigenvalues and eigenvectors contribute to understanding the stability of a system?

Discuss the role of linear transformations in computer graphics.

What is the eigenvalue of the identity matrix of size 3x3?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3

What is the determinant of the matrix \(\begin{matrix} 3 & 4 \\ 2 & 1 \end{matrix}\)?

- ◯ -5
- ◯ 5
- ◯ 10
- ◯ -10

What is the dimension of a vector space defined by the set of all 2x2 matrices?

- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

Which of the following are properties of a vector space?

- ☐ Closure under addition
- ☐ Closure under scalar multiplication
- ☐ Existence of a zero vector
- ☐ Existence of a multiplicative inverse

Which of the following statements are true about orthogonal matrices?

- ☐ Their transpose is equal to their inverse.
- ☐ They preserve vector norms.
- ☐ They are always square matrices.
- ☐ Their determinant is always zero.

Which of the following vectors is orthogonal to \(\begin{matrix} 1 \\ 2 \end{matrix}\)?

- ◯ \(\begin{matrix} 2 \\ 1 \end{matrix}\)
- ◯ \(\begin{matrix} -2 \\ 1 \end{matrix}\)
- ◯ \(\begin{matrix} 1 \\ -2 \end{matrix}\)
- ◯ \(\begin{matrix} 0 \\ 0 \end{matrix}\)

Which of the following are methods to solve a system of linear equations?

- ☐ Gaussian elimination
- ☐ Matrix inversion
- ☐ Cross product

- [ ] Substitution method