

# Linear Algebra Interview Questions

linear algebra questions

- [synthetic data engineer interview](#)

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Technical artists, especially those involved in computer graphics, may be asked coding questions related to linear algebra during interviews. These questions are designed to assess their understanding of mathematical concepts and their ability to apply them to solve problems in the context of computer graphics and game development. Here are some example questions:

- 1. Matrix Operations:**
  - Implement matrix addition, subtraction, and multiplication.
  - Write a function to transpose a matrix.
- 2. Vector Operations:**
  - Implement vector addition, subtraction, and dot product.
  - Write a function to calculate the cross product of two vectors.
- 3. Transformations:**
  - Implement a function to create a 2D or 3D transformation matrix for translation, rotation, and scaling.
  - Write code to apply a transformation matrix to a vector.
- 4. Matrix Inversion:**
  - Implement a function to find the inverse of a square matrix.
- 5. Eigenvalues and Eigenvectors:**
  - Explain the concept of eigenvalues and eigenvectors.
  - Write a function to compute the eigenvalues and eigenvectors of a matrix.
- 6. Projection and Reflection:**
  - Write code to project a 3D point onto a 2D plane.
  - Implement a function to reflect a vector across a plane.
- 7. Homogeneous Coordinates:**
  - Explain the concept of homogeneous coordinates.
  - Write code to convert between 3D Cartesian coordinates and homogeneous coordinates.
- 8. Singular Value Decomposition (SVD):**
  - Describe what Singular Value Decomposition is and its applications.
  - Implement a function to perform SVD on a matrix.
- 9. Linear Least Squares:**
  - Explain the concept of linear least squares.
  - Write code to solve a linear least squares problem.
- 10. Coordinate Spaces:**
  - Describe the difference between object space, world space, view space, and screen space.
  - Write code to transform a point through different coordinate spaces.

These questions aim to assess the candidate's ability to manipulate matrices and vectors, understand geometric transformations, and apply linear algebra concepts to solve practical problems encountered in computer graphics and game development.

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