Linear Algebra Revision Test

Wigner Data and Compute Intensive Sciences Group

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Name: _____

Part 1: Vectors

Calculate the given exercises:

1. $\begin{bmatrix} 1 \\ -2 \\ 3 \\ 0 \end{bmatrix} \cdot \begin{bmatrix} 4 \\ 1 \\ -1 \\ 2 \end{bmatrix} =$ _____

2. $\begin{bmatrix} 2 \\ -1 \\ 3 \\ 1 \\ 0 \end{bmatrix} + \begin{bmatrix} -3 \\ 2 \\ 0 \\ 4 \\ -1 \end{bmatrix} =$ _____

Part 2: Vector-Matrix Multiplication

Multiply the vector with the matrix:

3. $\begin{bmatrix} 2 & -1 & 3 \\ 0 & 4 & 1 \\ -2 & 0 & 5 \\ 1 & 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix} =$ _____

4. $\begin{bmatrix} 1 & 0 & 2 & -1 \\ 3 & -2 & 1 & 0 \\ 0 & 1 & 4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 2 \\ -1 \\ 0 \\ 3 \end{bmatrix} =$ _____

Part 3: Matrix-Matrix Multiplication

Multiply the matrices:

5. $\begin{bmatrix} 2 & -1 & 0 \\ 3 & 1 & 2 \\ -1 & 4 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ -2 & 0 \\ 3 & -1 \end{bmatrix} =$ _____

6. $\begin{bmatrix} 1 & 0 & 2 & -1 \\ 2 & 3 & -1 & 0 \\ 0 & 1 & 4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 2 & -1 & 0 \\ 1 & 0 & 3 \\ -2 & 4 & 1 \\ 0 & 2 & -1 \end{bmatrix} =$ _____

Part 4: Matrix Determinant

Calculate the determinant:

7. $\det \begin{pmatrix} 3 & 1 & 0 \\ -1 & 2 & 2 \\ 0 & 1 & -1 \end{pmatrix} =$ _____

8. $\det \begin{pmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -1 \end{pmatrix} =$ _____

Part 5: Eigenproblems

9. For $A = \begin{bmatrix} 1 & 2 \\ 5 & 2 \end{bmatrix}$:

   - Eigenvalues: _____, _____, _____
   - Corresponding eigenvectors: _____, _____, _____

10. Which vectors are eigenvectors of $\begin{bmatrix} 4 & 1 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 3 \end{bmatrix}$?

    Choose all that apply! $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$ $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$