Math 236 - Assignment 10

Name _____

April 22, 2026

Score _____

This assignment is for practice only. It will not be collected.

1. Prove that for square matrices "is similar to" is an equivalence relation.

2. Show by computation that $\begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$ is not diagonalizable.

3. Let $\begin{pmatrix} 4 & -1 & 6 \\ 2 & 1 & 6 \\ 2 & -1 & 8 \end{pmatrix}$. Find the characteristic polynomial. Show that 2 is an eigenvalue of A. Find a basis for the eigenspace corresponding to $\lambda = 2$.

4. Find the characteristic polynomial of A.

$$\begin{pmatrix} 5 & -2 & 6 & -1 \\ 0 & 3 & -8 & 0 \\ 0 & 0 & 5 & 4 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

5. Construct a 2×2 matrix with only one (distinct) eigenvalue.

6. Show that if A^2 is the zero matrix, then the only eigenvalue of A is 0.

7. Diagonalize the following matrix.

$$\begin{pmatrix} 1 & 3 \\ 0 & 2 \end{pmatrix}$$

8. Diagonalize the following matrix.

$$\begin{pmatrix} 6 & 10 \\ -2 & -3 \end{pmatrix}$$

9. Diagonalize the following matrix.

$$\begin{pmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{pmatrix}$$