

Linear Algebra
Quiz 10

Name: _____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Find the characteristic polynomial of the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$.

$$\chi_A(\lambda) = \det(A - \lambda I) = \det \left(\begin{bmatrix} 1 - \lambda & 2 \\ 2 & 4 - \lambda \end{bmatrix} \right) = \lambda^2 - 5\lambda.$$

2. Find the eigenvalues of A .

$$\chi_A(\lambda) = \lambda^2 - 5\lambda = \lambda(\lambda - 5), \text{ so } \lambda = 0, 5 \text{ are the e-values.}$$

3. Find the eigenspaces of A .

$$V_0 = \text{Nul}(A - 0I) = \text{Nul} \left(\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix} \right) = \text{span} \left\{ \begin{bmatrix} 2 \\ -1 \end{bmatrix} \right\}.$$

$$V_5 = \text{Nul}(A - 5I) = \text{Nul} \left(\begin{bmatrix} -4 & 2 \\ 2 & -1 \end{bmatrix} \right) = \text{span} \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix} \right\}.$$