Test ID: TESTID Name: _____

MAT 250 **Quiz 6** Spring 2026

1. Given that A is a 2×2 real matrix, and that $det(A - \lambda I) = \lambda^2 - \lambda - 2$, which of the following is an eigenvalue of A?

   a) 0 b) 1 c) -1 d) -2 e) -3

   Correct Answer: -1

2. Suppose that A is a 3×3 real matrix with eigenvalue $\lambda = 2$, and that the matrix equation $A\mathbf{v} = 2\mathbf{v}$ converts to a linear system with augmented matrix that has reduced row-echelon form:

$$\left(\begin{array}{ccc|c} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right).$$

   What is the dimension of the eigenspace E_2 for A?

   a) 0 b) 2 c) 1 d) 3 e) 4

   Correct Answer: 1

3. Same A as in the previous question. Choose an eigenvector of A.

   a) $\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ b) $\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$ c) $\begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}$ d) $\begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}$ e) $\begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$

   Correct Answer: $\begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$

4. Same A as in the previous question. Suppose that A also has eigenvalue $\lambda = 3$, and that the matrix equation $A\mathbf{v} = 3\mathbf{v}$ converts to a linear system with augmented matrix that has reduced row-echelon form:

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right).$$

   What is the dimension of the eigenspace E_3 for A?

   a) 0 b) 2 c) 1 d) 3 e) 4

   Correct Answer: 1

5. Same A as in the previous question. Suppose that A has no other eigenvalues, other than 2 and 3. Which of the following statements must be True?

   i) A has two linearly independent eigenvectors
   ii) A is diagonalizable
   iii) A is invertible

   a) TFT b) TTT c) FFT d) TFF e) TTF

   Correct Answer: TFT