EXERCISES OF SECTION 7.1, 7.2

Question 1. Find all the eigenvalues and the corresponding eigenvectors of $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 5 & -2 \\ 1 & 1 & 2 \end{bmatrix}$.

Question 2. v is an eigenvaule of A with respect to the eigenvalue λ. Which of the following must be true?

a $c\lambda$ is an eigenvalue of cA.

b v is an eigenvalue of cA.

c cv is eigenvector of A with respect to the eigenvalue $c\lambda$.

d The dimension of the eigenspace with respect to λ is equal to the multiplicity of λ in the characteristic polynomial $p(\lambda)$ of A.

Question 3. An 4×4 matrix A has eigenvalues $1, -1, 2, 4$. Which of the following must be true?

a A is invertible.

b A is diagonalizable.

c A has 4 linearly independent eigenvectors.

d $AX = 0$ only has trivial solution.

which of these statements **must** be true

A. Only b, c and d.

B. Only b.

C. Only c.

D. None of them have to be true.

E. All of them have to be true.

Question 4. Which of the following matrices is not diagonalizable?

A. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

E. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$