Submitting HW Tips

HW # 10

(Several matrices below are repeated in the problems)

1 Which are diagonalizable? If the matrix is diagonalizable, find Q and D.

(a) $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (b) $A = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 3 & -1 \\ 0 & -2 & 2 \end{bmatrix}$ (c) $A = \begin{bmatrix} 1 & 1 \\ -4 & 5 \end{bmatrix}$

2 Let $A = \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix}$.

(a) Show A is diagonalizable.

(b) Using part(a), compute A^{20} and e^A.

(c) If $\mathbf{v} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, compute $A^{20}\,\mathbf{v}$.

3 If $A = \begin{bmatrix} 1 & 1 \\ -4 & 5 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, compute $A^{20}\,\mathbf{v}$.

4 Find all eigenvalues and a corresponding eigenvector for each eigenvalue of $A = \begin{bmatrix} 1 & -4 \\ 1 & 1 \end{bmatrix}$.

5 Find two linearly independent solutions to this linear system of differential equations:

$$\mathbf{x}'(t) = \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} \mathbf{x}(t)\,.$$

(This type of problem is covered in great detail in MA366/266/265/262/303/527.)