ASSIGNMENT #11

Please do not write your answers on a copy of this assignment, use blank paper. As with all assignments, there will conceptual and computational questions. For computational problems you may check your work using any tool you wish; however **you must clearly explain each step that you make in your computation.**

For this assignment I encourage you to work with others; however, you are expected to **submit your own work in your own words**. I will grade a subset of these problems and will take completion of the ungraded problems into account for the final grade of this assignment. Completion is worth 20% of the final grade of this assignment. To emphasize: **you must make an honest attempt on each problem for full points on the completion aspect of your grade.**

(1) For each of the following matrices, determine if the matrix is diagonalizable, and if so find P and D such that $A = PDP^{-1}$, where D is a diagonal matrix.

(a) $\begin{bmatrix} 1 & 0 \\ 6 & -1 \end{bmatrix}$

(b) $\begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 4 & 0 & 2 \\ 2 & 3 & 4 \\ 0 & 0 & 3 \end{bmatrix}$

(d) $\begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 1 & 0 & 0 & 2 \end{bmatrix}$

(2) Answer the following true and false questions. No justification is required.

(a) If two matrices have the same eigenvalues, then they are similar.

(b) A square matrix A of size n is diagonalizable if and only if it has n linearly independent eigenvectors.

(c) $A = PBP^{-1}$ and $A = QBQ^{-1}$, then $P = Q$.

(d) Let A be an $n \times n$ matrix. If the sum of the dimensions of the eigenspaces for A is equal to n, then A is diagonalizable.