

- 1a. Find the eigenvalues and corresponding eigenvectors to the matrix

$$A = \begin{pmatrix} 1 & 3 \\ 3 & 1 \end{pmatrix}.$$

- b. Find an invertible matrix V so that $V^{-1}AV = D$ where D is a diagonal matrix. Describe D .
- d. Suppose B is a 4×4 matrix with three distinct eigenvalues. One eigenvalue has geometric multiplicity one and one has geometric multiplicity two. Is it possible that B is not diagonalizable?

2a Problem 27 in section 3.2.

2b Why is it A is invertible if and only if $\det(A) \neq 0$

3a. Two matrices A and B are similar if $B = P^{-1}AP$ where P is an invertible matrix. Show that A and B have the same determinant.

3b. Show that A and B have the same characteristic polynomial.

3c. Find the characteristic polynomial of the matrix

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 1 & 1 & 2 \\ 0 & 3 & 2 \end{pmatrix}.$$

4a Problem 9 in section 3.2

4b Show by example that $\det(A + B) \neq \det(A) + \det(B)$.

5 Find the eigenvalues and corresponding eigenvectors to the matrix

$$A = \begin{pmatrix} 3 & 0 & 1 \\ 0 & 4 & 0 \\ 1 & 0 & 3 \end{pmatrix}$$