
PROBLEM SET

Eigenvalue Problems

Math 3351, Fall 2007

Oct 8, 2007

- Write all of your answers on separate sheets of paper. You can keep the question sheet.
- You **must** show enough work to justify your answers. Unless otherwise instructed, give exact answers, not approximations (e.g., $\sqrt{2}$, not 1.414).
- This problem set has 1 problems. There are **200 points total**.

Good luck!

200 pts.

Problem 1. In each part you are given a matrix A .

1. Find the characteristic polynomial of A .
2. Find the roots of the characteristic polynomial, which are the eigenvalues of A .
3. Find a basis for each of the eigenspaces of A .
4. Determine if A is diagonalizable. If so, find an invertible matrix P and a diagonal matrix D do that $P^{-1}AP = D$.

Use a calculator or Maple. You can turn in your work as a maple worksheet, if you want to.

A.

$$A = \begin{bmatrix} 14 & 15 & 18 \\ -20 & -23 & -30 \\ 5 & 7 & 11 \end{bmatrix}$$

B.

$$A = \begin{bmatrix} -7 & -11 & 9 & 2 \\ 3 & 6 & -3 & -1 \\ -5 & -6 & 7 & 1 \\ 3 & 5 & -3 & 0 \end{bmatrix}$$

C.

$$A = \begin{bmatrix} 47 & -15 & 45 & 10 \\ 6 & 5 & -18 & -25 \\ -60 & 21 & -64 & -20 \\ 54 & -18 & 54 & 14 \end{bmatrix}$$

D.

$$A := \begin{bmatrix} 0 & 0 & -5 \\ 1 & 0 & -1 \\ 0 & 1 & 3 \end{bmatrix}$$

E.

$$A = \begin{bmatrix} -3930 & 775 & -8593 & 860 & -254 \\ -1067 & -39 & -2354 & -66 & -88 \\ 1771 & -353 & 3872 & -392 & 114 \\ 739 & 58 & 1633 & 82 & 66 \\ 183 & 22 & 405 & 27 & 24 \end{bmatrix}$$