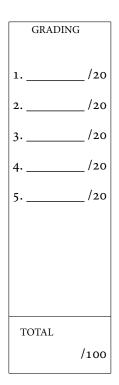
# 18.06 Exam IV: Eigenstuff 29 April 2016

STATE YOUR NAME: \_\_\_\_\_

	Roi	10-11	Sauer–Ayala
CIRCLE YOUR RECITATION:	Ro2	10-11	Carpentier
	Ro3	11-12	Sauer–Ayala
	Ro4	11-12	Carpentier
	Ro5	12-13	Hopkins
	Ro6	12-13	Anno
	Ro7	13-14	Hopkins
	Ro8	13-14	Anno
	Ro9	14-15	Fei
	R10	14-15	Knizel
	R11	15-16	Knizel



#### 1. YAH OR NEH?

For each of the following sentences, indicate whether they are true or false. (No need to justify your answer.)

- (a) If *A* is an  $n \times n$  matrix in which one row is a multiple of another, then det(A) = 0.
- (b) If *A* is a real  $n \times n$  matrix, then  $det(A^2) \ge 0$ .
- (c) If *A* is an  $n \times n$  matrix with *n* distinct real eigenvalues, then *A* is diagonalizable over **R**.
- (d) There are matrices that are diagonalizable over **C** but not diagonalizable over **R**.
- (e) The characteristic polynomial of an  $n \times n$  matrix with complex entries has degree *n*.

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#### 2. Determine ant

Compute

$$\det \begin{pmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}.$$

## 3. DUDLEY EIGENVALUE, DDS

Compute the eigenvalues and eigenspaces of

$$\begin{pmatrix} 1 & 9 \\ 4 & 1 \end{pmatrix} \text{ and } \begin{pmatrix} 1 & 9 & 0 \\ 4 & 1 & 0 \\ 0 & 0 & -2 \end{pmatrix}.$$

Are these matrices diagonalizable over R? Over C?

### 4. Complications

Compute the eigenvalues and eigenspaces of

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

Is this matrix diagonalizable over **R**? Over **C**?

5. VADE MECUM

Compute the eigenvalues and eigenspaces of

$$\begin{pmatrix} 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & -4 \\ 0 & 1 & 0 & -6 \\ 0 & 0 & 1 & -4 \end{pmatrix}.$$