

# EXERCISE SET

## 7.1

1. Find the characteristic equations of the following matrices:

(a)  $\begin{bmatrix} 3 & 0 \\ 8 & -1 \end{bmatrix}$       (b)  $\begin{bmatrix} 10 & -9 \\ 4 & -2 \end{bmatrix}$       (c)  $\begin{bmatrix} 0 & 3 \\ 4 & 0 \end{bmatrix}$

(d)  $\begin{bmatrix} -2 & -7 \\ 1 & 2 \end{bmatrix}$       (e)  $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$       (f)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

2. Find the eigenvalues of the matrices in Exercise 1.

Eigenvectors corresponding to the eigenvalues

3. Find ~~bases for the eigenspaces~~ of the matrices in Exercise 1.

4. Find the characteristic equations of the following matrices:

(a)  $\begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$       (b)  $\begin{bmatrix} 3 & 0 & -5 \\ \frac{1}{5} & -1 & 0 \\ 1 & 1 & -2 \end{bmatrix}$       (c)  $\begin{bmatrix} -2 & 0 & 1 \\ -6 & -2 & 0 \\ 19 & 5 & -4 \end{bmatrix}$

(d)  $\begin{bmatrix} -1 & 0 & 1 \\ -1 & 3 & 0 \\ -4 & 13 & -1 \end{bmatrix}$       (e)  $\begin{bmatrix} 5 & 0 & 1 \\ 1 & 1 & 0 \\ -7 & 1 & 0 \end{bmatrix}$       (f)  $\begin{bmatrix} 5 & 6 & 2 \\ 0 & -1 & -8 \\ 1 & 0 & -2 \end{bmatrix}$

5. Find the eigenvalues of the matrices in Exercise 4.

Eigenvectors corresponding to the eigenvalues

6. Find ~~bases for the eigenspaces~~ of the matrices in Exercise 4.

7. Find the characteristic equations of the following matrices:

(a)  $\begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$       (b)  $\begin{bmatrix} 10 & -9 & 0 & 0 \\ 4 & -2 & 0 & 0 \\ 0 & 0 & -2 & -7 \\ 0 & 0 & 1 & 2 \end{bmatrix}$