

# MATH 134A Review: Eigenvalues and Eigenvectors

## Facts to Know

An eigenvalue  $\lambda$  and corresponding eigenvector (in the  $\lambda$ -eigenspace) of an  $n \times n$  matrix  $A$  is

Theorem: the eigenvalues of a triangular matrix are the entries on its main diagonal

Theorem: If  $\mathbf{v}_1$  and  $\mathbf{v}_2$  are two eigenvectors corresponding to distinct eigenvalues  $\lambda_1$  and  $\lambda_2$ , then  $\mathbf{v}_1$  and  $\mathbf{v}_2$  are linearly independent.

A method to find the eigenvalues of a matrix is

A method to find a basis for the eigenspace corresponding to a given eigenvalue is

## Examples

1. Find one eigenvalue for the following matrix.

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

2. Find a basis for the corresponding eigenspace.

$$A = \begin{pmatrix} 4 & -1 & 6 \\ 2 & 1 & 6 \\ 2 & -1 & 8 \end{pmatrix}, \quad \lambda = 2$$