Assignment WW-Diagonalise

1. (1 point) Find the eigenvalues $\lambda_1 < \lambda_2$ and associated unit eigenvectors \vec{u}_1, \vec{u}_2 of the symmetric matrix

$$A = \left[\begin{array}{cc} -7 & 16 \\ 16 & 17 \end{array} \right].$$

The smaller eigenvalue $\lambda_1 =$ _____ has associated unit eigenvector $\vec{u}_1 =$ $\begin{bmatrix} & & \\ & & \end{bmatrix}$.

The larger eigenvalue $\lambda_2 =$ _____ has associated unit eigenvector $\vec{u}_2 =$ $\begin{bmatrix} & & \\ & & \end{bmatrix}$.

Note: The eigenvectors above form an orthonormal eigenbasis for A.

Correct Answers:

- −15
- -0.894427 0.447214
- 25
- $\begin{bmatrix} -0.447214 \\ -0.894427 \end{bmatrix}$
- **2.** (1 point) Find a 2×2 matrix A such that

$$\begin{bmatrix} -3 \\ 2 \end{bmatrix}$$
, and $\begin{bmatrix} 0 \\ -1 \end{bmatrix}$

are eigenvectors of A with eigenvalues 4 and -7, respectively.

$$A = \left[\begin{array}{cc} - & - \\ - & - \end{array} \right]$$

Correct Answers

$$\begin{bmatrix} 4 & 0 \\ -7.33333 & -7 \end{bmatrix}$$

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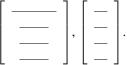
3. (1 point) Find the eigenvalues $\lambda_1 < \lambda_2$ and associated orthonormal eigenvectors of the symmetric matrix

$$A = \left[\begin{array}{cccc} 5 & 0 & 0 & 3 \\ 0 & 5 & 3 & 0 \\ 0 & 3 & 5 & 0 \\ 3 & 0 & 0 & 5 \end{array} \right].$$

 $\lambda_1 =$ ____ has associated orthonormal eigenvectors



 $\lambda_2 =$ ____ has associated orthonormal eigenvectors



Note: The eigenvectors above form an orthonormal eigenbasis for A.

Correct Answers:

- 2
- [[0.5], [0.5], [-0.5], [-0.5]],

 -0.5
 0.5
 -0.5
 0.5
- 8

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