

1. (1 pt) Library/Rochester/setLinearAlgebra18OrthogonalBases-ur_la_18.11.pg

Let $A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & -3 & 1 \\ -1 & -6 & 2 \end{bmatrix}$.

Find an orthonormal basis of the column space of A .

$\begin{bmatrix} _ \\ _ \\ _ \end{bmatrix}, \begin{bmatrix} _ \\ _ \\ _ \end{bmatrix}$.

Correct Answers:

- $\left(\begin{array}{c} 0.577350269189626 \\ -0.577350269189626 \\ -0.577350269189626 \end{array} \right), \left(\begin{array}{c} 0.707106781186547 \\ 0 \\ 0.707106781186547 \end{array} \right)$

2. (1 pt) Library/Rochester/setLinearAlgebra18OrthogonalBases-ur_la_18.7.pg

Let $A = \begin{bmatrix} 4 & 1 & 12 & -3 \\ -1 & -1 & -3 & 3 \end{bmatrix}$.

Find an orthonormal basis of the kernel of A .

$\begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}, \begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}$.

Correct Answers:

- $\left(\begin{array}{c} -0.948683298050514 \\ 0 \\ 0.316227766016838 \\ 0 \end{array} \right), \left(\begin{array}{c} 0.948683298050514 \\ 0 \\ 0.316227766016838 \\ 0 \end{array} \right)$

3. (1 pt) Library/Rochester/setLinearAlgebra22SymmetricMatrices-ur_la_22.6.pg

The matrix $M = \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & -1 & 0 \\ 0 & -1 & 1 & 0 \\ -1 & 0 & 0 & 1 \end{bmatrix}$.

has two distinct eigenvalues $\lambda_1 < \lambda_2$. Find the eigenvalues and an orthonormal basis for each eigenspace.

$\lambda_1 = _$,

associated unit eigenvector = $\begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}, \begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}$,

$\lambda_2 = _$,

associated unit eigenvector = $\begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}, \begin{bmatrix} _ \\ _ \\ _ \\ _ \end{bmatrix}$.

The above eigenvectors form an orthonormal eigenbasis for M .

Correct Answers:

- 0
- $\left(\begin{array}{c} 0.5 \\ -0.5 \\ -0.5 \\ 0.5 \end{array} \right), \left(\begin{array}{c} 0.5 \\ 0.5 \\ 0.5 \\ 0.5 \end{array} \right)$
- 2
- $\left(\begin{array}{c} 0.5 \\ -0.5 \\ 0.5 \\ -0.5 \end{array} \right), \left(\begin{array}{c} 0.5 \\ -0.5 \\ 0.5 \\ 0.5 \end{array} \right)$

4. (1 pt) Library/Rochester/setLinearAlgebra19QRfactorization-ur_la_19.4.pg

Find the QR factorization of $M = \begin{bmatrix} 9 & 15 \\ 9 & 9 \\ 9 & 15 \\ -9 & -9 \end{bmatrix}$.

$M = \begin{bmatrix} _ & _ \\ _ & _ \\ _ & _ \\ _ & _ \end{bmatrix} \begin{bmatrix} _ & _ \\ _ & _ \end{bmatrix}$.

Correct Answers:

- 0.5
- 0.5
- 0.5
- 0.5
- 0.5
- 0.5
- 0.5
- 0.5
- 18
- 24
- 0
- 6

5. (1 pt) Library/Rochester/setLinearAlgebra19QRfactorization-
ur_la_19_3.pg

Find the QR factorization of $M = \begin{bmatrix} 6 & 4 & 1 \\ 6 & 1 & -11 \\ 3 & -1 & 2 \end{bmatrix}$.

$$M = \begin{bmatrix} ______ & ______ & ______ \\ ______ & ______ & ______ \\ ______ & ______ & ______ \end{bmatrix} \begin{bmatrix} ______ & ______ & ______ \\ ______ & ______ & ______ \\ ______ & ______ & ______ \end{bmatrix}.$$

Correct Answers:

- 0.666666666666667
- 0.666666666666667
- 0.333333333333333
- 0.666666666666667

- -0.333333333333333
- -0.666666666666667
- 0.333333333333333
- -0.666666666666667
- 0.666666666666667
- 9
- 3
- -6
- 0
- 3
- 3
- 0
- 0
- 9