1. **(1 pt) Library/Rochester/setLinearAlgebra17DotProductRn-/ur_la_17_6.pg**

Find a vector v perpendicular to the vector $u = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$.

$v = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$.

Correct Answers:

- `\(\displaystyle\left.\begin{array}{c}`
  `\mbox{-1} \cr`
  `\mbox{-2} \cr`
  `\end{array}\right.\)`

2. **(1 pt) Library/Rochester/setLinearAlgebra17DotProductRn-/ur_la_17_7.pg**

Find the value of k for which the vectors

$x = \begin{bmatrix} -5 \\ -1 \\ -1 \\ 2 \end{bmatrix}$ and $y = \begin{bmatrix} 4 \\ 2 \\ -5 \\ k \end{bmatrix}$ are orthogonal.

$k =$ ____.

Correct Answers:

- `8.5`

3. **(1 pt) Library/TCNJ/TCNJ_OrthogonalSets/problem9.pg**

Given $v = \begin{bmatrix} -9 \\ -5 \end{bmatrix}$, find the coordinates for v in the subspace W spanned by $u_1 = \begin{bmatrix} 6 \\ -1 \end{bmatrix}$ and $u_2 = \begin{bmatrix} -6 \\ -36 \end{bmatrix}$. Note that u_1 and u_2 are orthogonal.

$v =$ ____ $u_1 +$ ____ u_2

Correct Answers:

- `-1.32432432432432`
- `0.175675675675676`

4. **(1 pt) Library/Rochester/setLinearAlgebra14TransfOfRn-/ur_la_14_18.pg**

Let L be the line in $\mathbb{R}^3$ that consists of all scalar multiples of the vector $\begin{bmatrix} 1 \\ 2 \\ -2 \end{bmatrix}$. Find the orthogonal projection of the vector $v = \begin{bmatrix} 9 \\ 8 \\ 6 \end{bmatrix}$ onto L.

$\text{proj}_L v = \begin{bmatrix} \_\_\_\_ \\ \_\_\_\_ \\ \_\_\_\_ \end{bmatrix}$.

Correct Answers:

- `1.44444444444444`
- `2.88888888888889`
- `-2.88888888888889`

5. **(1 pt) Library/Rochester/setLinearAlgebra18OrthogonalBases-/ur_la_18_4.pg**

Let $x = \begin{bmatrix} 8 \\ 6 \\ 8 \\ 0 \end{bmatrix}$ and $y = \begin{bmatrix} 4 \\ -6 \\ -20 \\ 9 \end{bmatrix}$.

Use the Gram-Schmidt process to determine an orthonormal basis for the subspace of $\mathbb{R}^4$ spanned by x and y.

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

Correct Answers:

- `0.624695047554424`
- `0.468521285665818`
- `0.624695047554424`
- `0`
- `0.624695047554424`
- `0`
- `-0.624695047554424`
- `0.468521285665818`

6. **(1 pt) Library/Rochester/setLinearAlgebra17DotProductRn-/ur_la_17_21.pg**

Let $v_1 = \begin{bmatrix} -0.5 \\ -0.5 \\ 0.5 \\ 0.5 \end{bmatrix}$, $v_2 = \begin{bmatrix} 0.5 \\ -0.5 \\ 0.5 \\ -0.5 \end{bmatrix}$, and $v_3 = \begin{bmatrix} 0.5 \\ -0.5 \\ -0.5 \\ 0.5 \end{bmatrix}$.

Find a vector v_4 in $\mathbb{R}^4$ such that the vectors v_1, v_2, v_3, and v_4 are orthonormal.

$v_4 = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$.

Correct Answers:

- `\(\displaystyle\left.\begin{array}{c}`
  `\mbox{0.5} \cr`
  `\mbox{0.5} \cr`
  `\mbox{0.5} \cr`
  `\mbox{0.5} \cr`
  `\end{array}\right.\)`

7. **(1 pt) Library/Rochester/setLinearAlgebra12Diagonalization-/ur_la_12_2.pg**

Let $M = \begin{bmatrix} 10 & -10 \\ 5 & -5 \end{bmatrix}$.

Find formulas for the entries of M^n, where n is a positive integer.

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

Correct Answers:

- `2*(5**n)`
- `- -1*-2*(5**n)`
- `-1*-1*(5**n)`
- `- 5**n`

8. **(1 pt) Library/Rochester/setLinearAlgebra22SymmetricMatrices-/ur_la_22_3.pg**

Find the eigenvalues and associated unit eigenvectors of the (symmetric) matrix

$A = \left[\begin{array}{cc} -3 & -6 \\ -6 & -12 \end{array} \right]$.

smaller eigenvalue = ____,

associated unit eigenvector = $\left[\begin{array}{c} \_\_ \\ \_\_ \end{array} \right]$,

larger eigenvalue = ____,

associated unit eigenvector = $\left[\begin{array}{c} \_\_ \\ \_\_ \end{array} \right]$.

The above eigenvectors form an orthonormal eigenbasis for A.

Correct Answers:

- -15
- \(\displaystyle\left.\begin{array}{c} \mbox{-0.447213595499958} \cr \mbox{-0.894427190999916} \cr \end{array}\right.\)
- 0
- \(\displaystyle\left.\begin{array}{c} \mbox{0.894427190999916} \cr \mbox{-0.447213595499958} \cr \end{array}\right.\)