WebAssign
CH 5.5 (Homework)

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MA 265 Spring 2013, section 132, Spring 2013
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Current Score : 20 / 20 **Due :** Thursday, March 28 2013 11:40 PM EDT

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

Request Extension View Key

1. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.001.

Let W be the subspace of R^3 spanned by the vector

$$\mathbf{w} = \begin{bmatrix} 9 \\ -6 \\ 7 \end{bmatrix}.$$

(a) Find a basis for $W^\perp$.

1	0
0	1
-9/7	6/7

(b) Describe $W^\perp$ geometrically.

$W^\perp$ is the plane whose normal is **w**.

2. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.003.

Let W be the subspace of R_5 spanned by the vectors $\mathbf{w}_1$, $\mathbf{w}_2$, $\mathbf{w}_3$, $\mathbf{w}_4$, $\mathbf{w}_5$, where

$$\mathbf{w}_1 = \begin{bmatrix} 2 & -1 & 1 & 4 & 0 \end{bmatrix},$$
$$\mathbf{w}_2 = \begin{bmatrix} 1 & 2 & 0 & 1 & -2 \end{bmatrix},$$
$$\mathbf{w}_3 = \begin{bmatrix} 4 & 3 & 1 & 6 & -4 \end{bmatrix},$$
$$\mathbf{w}_4 = \begin{bmatrix} 3 & 1 & 2 & -1 & 1 \end{bmatrix},$$
$$\mathbf{w}_5 = \begin{bmatrix} 2 & -1 & 2 & -2 & 3 \end{bmatrix}.$$

Find a basis for $W^\perp$.

-21/5	8/5	6	1	0
8/5	1/5	-3	0	1

✓

3. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.004.

Let W be the subspace of R^4 spanned by the vectors $\mathbf{w}_1$, $\mathbf{w}_2$, $\mathbf{w}_3$, $\mathbf{w}_4$, where

$$\mathbf{w}_1 = \begin{bmatrix} 3 \\ 0 \\ -1 \\ 3 \end{bmatrix}, \quad \mathbf{w}_2 = \begin{bmatrix} 1 \\ 2 \\ 1 \\ -5 \end{bmatrix},$$

$$\mathbf{w}_3 = \begin{bmatrix} 4 \\ 2 \\ 0 \\ -2 \end{bmatrix}, \quad \mathbf{w}_4 = \begin{bmatrix} 10 \\ 2 \\ -2 \\ 4 \end{bmatrix}.$$

Find a basis for $W^\perp$.

1/3	-1
-2/3	3
1	0
0	1

✓

4. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.007.

Let W be the plane $9x + 2y - z = 0$ in R^3. Find a basis for $W^{\perp}$.

-9
-2
1

5. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.012.

Find $\text{proj}_W\mathbf{v}$ for the given vector $\mathbf{v}$ and subspace W.

Let V be the Euclidean space R_4, and W the subspace with basis

$$\begin{bmatrix} 1 & 1 & 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} -1 & 0 & 0 & 1 \end{bmatrix}.$$

(a) $\mathbf{v} = \begin{bmatrix} 2 & 1 & 6 & 0 \end{bmatrix}$

$\text{proj}_W\mathbf{v} =$

4/5	17/5	18/5	-6/5

(b) $\mathbf{v} = \begin{bmatrix} 0 & 1 & -1 & 0 \end{bmatrix}$

$\text{proj}_W\mathbf{v} =$

2/5	1/5	-1/5	2/5

(c) $\mathbf{v} = \begin{bmatrix} 0 & 2 & 0 & 3 \end{bmatrix}$

$\text{proj}_W\mathbf{v} =$

1/10	9/5	1/5	31/10

6. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.014.

Find $\text{proj}_W\mathbf{v}$ for the given vector $\mathbf{v}$ and subspace W.

Let W be the plane in R^3 given by the equation $x + y - 2z = 0$.

(a) $\mathbf{v} = \begin{bmatrix} 0 \\ 2 \\ -1 \end{bmatrix}$

$\text{proj}_W\mathbf{v} = \begin{bmatrix} -2/3 \\ 4/3 \\ 1/3 \end{bmatrix}$

(b) $\mathbf{v} = \begin{bmatrix} 3 \\ 1 \\ 3 \end{bmatrix}$

$\text{proj}_W\mathbf{v} = \begin{bmatrix} 10/3 \\ 4/3 \\ 7/3 \end{bmatrix}$

(c) $\mathbf{v} = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$

$\text{proj}_W\mathbf{v} = \begin{bmatrix} 1/2 \\ -1/2 \\ 0 \end{bmatrix}$

7. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.016.

Let W be the subspace of R^4 with orthonormal basis $\{\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3\}$, where

$$\mathbf{w}_1 = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ 0 \\ 0 \\ -\frac{1}{\sqrt{2}} \end{bmatrix}, \quad \mathbf{w}_2 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \text{ and } \mathbf{w}_3 = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ 0 \\ 0 \\ \frac{1}{\sqrt{2}} \end{bmatrix}.$$

Write the vector

$$\mathbf{v} = \begin{bmatrix} 2 \\ 0 \\ 8 \\ 4 \end{bmatrix}$$

as $\mathbf{w} + \mathbf{u}$ with $\mathbf{w}$ in W and $\mathbf{u}$ in $W^{\perp}$.

$\mathbf{w} =$ 2, 0, 8, 4

$\mathbf{u} =$ 0, 0, 0, 0

8. 2.22/2.22 points | Previous Answers KolmanLinAlg9 5.5.018.

Let W be the plane in R^3 given by the equation $x - y - z = 0$. Write the vector $\mathbf{v} = \begin{bmatrix} 0 \\ -2 \\ -4 \end{bmatrix}$ as $\mathbf{w} + \mathbf{u}$, with $\mathbf{w}$ in W and $\mathbf{u}$ in $W^{\perp}$.

$\mathbf{w} = \begin{bmatrix} \boxed{-2} \\ \boxed{0} \\ \boxed{-2} \end{bmatrix}$

$\mathbf{u} = \begin{bmatrix} \boxed{2} \\ \boxed{-2} \\ \boxed{-2} \end{bmatrix}$

9. 2.24/2.24 points | Previous Answers KolmanLinAlg9 5.5.020.

Let W be the subspace of R^4 with orthonormal basis $\{\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3\}$, where

$$\mathbf{w}_1 = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ 0 \\ 0 \\ -\frac{1}{\sqrt{2}} \end{bmatrix}, \quad \mathbf{w}_2 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \text{ and } \mathbf{w}_3 = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ 0 \\ 0 \\ \frac{1}{\sqrt{2}} \end{bmatrix},$$

and let $\mathbf{v} = \begin{bmatrix} 1 \\ -3 \\ -1 \\ 0 \end{bmatrix}$. Find the distance from $\mathbf{v}$ to W.

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