Chapter 5- Answers to even problems.

Section 5.1

2. $\|\vec{v}\| = \sqrt{29}$
4. $\alpha = \cos^{-1}(\frac{18}{\sqrt{340}}) \approx 0.219 radians$
6. $\alpha = \cos^{-1}(\frac{-3}{\sqrt{540}}) \approx 1.700 radians$
8. Right Angle
10. $\vec{u}\cdot\vec{v} = 2+3k+4 = 6+3k$ and if they are perpendicular, then $6+3k = 0 \Longrightarrow k = -2$.
28. With $\vec{u}_1 = \frac{1}{2}\begin{bmatrix}1\\1\\1\\1\end{bmatrix}$, $\vec{u}_2 = \frac{1}{2}\begin{bmatrix}1\\1\\-1\\-1\end{bmatrix}$, $\vec{u}_3 = \frac{1}{2}\begin{bmatrix}1\\-1\\-1\\1\end{bmatrix}$, the projection of $\vec{e}_1 = \begin{bmatrix}1\\0\\0\\0\end{bmatrix}$ onto the space V spanned by $\vec{u}_1, \vec{u}_2, \vec{u}_3$ is given by

$$Proj_V \vec{e}_1 = (\vec{e}_1 \cdot \vec{u}_1)\vec{u}_1 + (\vec{e}_1 \cdot \vec{u}_2)\vec{u}_2 + (\vec{e}_1 \cdot \vec{u}_3)\vec{u}_3 = \frac{1}{4}\begin{bmatrix}3\\1\\-1\\1\end{bmatrix}.$$

Section 5.2

2. $\vec{w}_1 = \begin{bmatrix}6/7\\3/7\\2/7\end{bmatrix}$ and $\vec{w}_2 = \begin{bmatrix}2/7\\-6/7\\3/7\end{bmatrix}$.
4. $\vec{w}_1 = \begin{bmatrix}4/5\\0\\3/5\end{bmatrix}$, $\vec{w}_2 = \begin{bmatrix}21/35\\0\\-28/35\end{bmatrix}$ and $\vec{w}_3 = \begin{bmatrix}0\\-1\\0\end{bmatrix}$.
6. $\vec{w}_1 = \begin{bmatrix}1\\0\\0\end{bmatrix}$, $\vec{w}_2 = \begin{bmatrix}0\\1\\0\end{bmatrix}$ and $\vec{w}_3 = \begin{bmatrix}0\\0\\1\end{bmatrix}$.