MATH 335 Quiz 4 Name: .
Fall 16

Show all work. 5 points each.

1. Show $\begin{bmatrix}1\\1\\1\\1\end{bmatrix}$ and $\begin{bmatrix}1\\-1\\1\\-1\end{bmatrix}$ are orthogonal and verify they satisfy the Pythagorean Theorem $\|\mathbf{u}+\mathbf{v}\|^2 = \|\mathbf{u}\|^2 + \|\mathbf{v}\|^2$.

2. Compute the orthogonal projection, $\hat{\mathbf{y}} = \left(\frac{\mathbf{y}\cdot\mathbf{u}}{\mathbf{u}\cdot\mathbf{u}}\right)\mathbf{u}$, of $\mathbf{y} = \begin{bmatrix}1\\7\end{bmatrix}$ onto $\mathbf{u} = \begin{bmatrix}-4\\2\end{bmatrix}$. Show $\mathbf{z} = \mathbf{y} - \hat{\mathbf{y}}$ is orthogonal to $\mathbf{u}$.