Orthogonal Projections and the Spectral Theorem- HW

1. Let $V = \mathbb{R}^2$ and W =span$\{< 1,3 >\}$. Find $[T]_\beta$, where β =standard ordered basis for V and T is the orthogonal projection of V onto W.

2. Let $V = \mathbb{R}^3$ and W =span$\{< 1,0,2 >\}$. Find $[T]_\beta$, where β =standard ordered basis for V and T is the orthogonal projection of V onto W.

3. Find the spectral decomposition of:

   a. $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$

   b. $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$

   c. $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 3 & -2 \\ 1 & -2 & 3 \end{pmatrix}$

   You can use the results from problem number 2 on the HW on Normal and Self-Adjoint Operators.