Math 4326 Symmetric matrix worksheet.

(1) Find an orthogonal matrix which diagonalizes $A = \begin{pmatrix} 5 & 4 & -2 \\ 4 & 5 & -2 \\ -2 & -2 & 2 \end{pmatrix}$

given that $v = \begin{pmatrix} 1 \\ 1 \\ -\frac{1}{2} \end{pmatrix}$ and $w = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}$ are eigenvectors.

(2) Find the eigenvalues of a general projection matrix P (a matrix such that $P^2 = P$). Find a non-symmetric 2 by 2 projection matrix.