Math 1553 Worksheet §6.1 - §6.5

1. True/False. Justify your answer.

a) If u is a vector that is orthogonal to itself, then $u = 0$.

b) If y is in a subspace W, the orthogonal projection of y onto $W^{\perp}$ is 0.

c) If x is orthogonal to v and w, then x is also orthogonal to $v - w$.

2. **a)** Find the standard matrix B for proj_W, where $W = \text{Span}\left\{\begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}\right\}$.

b) What are the eigenvalues of B? Is B diagonalizable?

c) Let $x = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}$. Find the projection x_W of x onto the subspace W and the orthogonal projection $x_{W^\perp}$ of x onto the subspace $W^\perp$.

3. Use least-squares to find the best fit line $y = Ax + B$ through the points $(0, 0)$, $(1, 8)$, $(3, 8)$, and $(4, 20)$.