Math 1553 Worksheet, Chapter 7

1. True or false (justify your answer!): If \( u, v, w \) are vectors in \( \mathbb{R}^n \) with \( u \perp v \) and \( v \perp w \), then \( u \perp w \).

2. Let \( W \) be the set of all vectors in \( \mathbb{R}^3 \) of the form \((x, x - y, y)\) where \( x \) and \( y \) are real numbers.
   a) Find a basis for \( W^\perp \).
   
   b) Find the matrix \( B \) for orthogonal projection onto \( W \).

   c) Diagonalize \( B \) by finding an invertible matrix \( C \) and diagonal matrix \( D \) so that \( B = CD C^{-1} \).
3. Find, and draw, the best fit line $y = Mx + B$ through the points $(0, 0)$, $(1, 8)$, $(3, 8)$, and $(4, 20)$. 