1. Find the orthogonal decomposition of v with respect to W.

$$v = \begin{bmatrix} 4 \\ -2 \\ 3 \end{bmatrix} \text{ and } W = \text{span}\left(\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} \right)$$

2. $A = \begin{pmatrix} 2 & 8 & 2 \\ 1 & 7 & -1 \\ -2 & -2 & 1 \end{pmatrix}$.

(a) By applying the Gram-Schmidt Process to the columns of A to find the matrix Q that has orthonormal column vectors.

(b) Find the upper triangular matrix R such that $A = QR$.

(b) Using the above QR factorization of A, solve the system below.
$2x + 8y + 2z = 0$

$x + 7y - z = -3.5$

$-2x - 2y + z = 0$