1 Do the following vectors form an orthogonal system?

$$u_1 = \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} \qquad u_2 = \begin{bmatrix} 2 \\ 2 \\ 1 \end{bmatrix} \qquad u_3 = \begin{bmatrix} 1 \\ 1 \\ -4 \end{bmatrix}$$

2 Normalize the three vectors above and call v_1, v_2, v_3 the resulting vectors.

3 Is $S = \{v_1, v_2, v_3\}$ an orthogonal basis of $\mathbb{R}^3$? Is it an an orthonormal basis?

4 Find an expression of the vector $x = [-1; 1; 0]$ (matlab notation) in the basis S.