
Exercise 1 Vectors $\mathbf{q}_1 = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ and $\mathbf{q}_2 = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$ form an orthonormal basis for the plane $x - y - 2z = 0$.

(You should know how to verify that $\mathbf{q}_1, \mathbf{q}_2$ are orthonormal.) Use orthogonal projections to express $\mathbf{x} = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ as a linear combination of $\mathbf{q}_1$ and $\mathbf{q}_2$.

Enter exact coefficients below. Do not round.

$$\mathbf{x} = \dots \mathbf{q}_1 + \dots \mathbf{q}_2$$