$$q_2 = \frac{v_2}{\|v_2\|} = \left(-\frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right)$$

$$q_3 = \frac{v_3}{\|v_3\|} = \left(0, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$$

QR - Decomposition:

A is an $m \times n$ matrix with linearly independent column vectors, then A can be factored as

$$\boxed{A = QR}$$

where Q is an $m \times n$ matrix with orthonormal column vectors and R is an $n \times n$ invertible upper triangular matrix.

$$R = \begin{bmatrix} \langle u_1, q_1 \rangle & \langle u_2, q_2 \rangle & \langle u_3, q_3 \rangle \\ 0 & \langle u_2, q_2 \rangle & \langle u_3, q_2 \rangle \\ 0 & 0 & \langle u_4, q_3 \rangle \end{bmatrix}$$