Taking the vector $\vec{v} = (2, 1, 4)$ and angle $\theta_0 = 22.5$.

$$q_0 = (cos(\theta_0), sin(\theta_0) \times |\vec{v}|))$$

$$||\vec{v}|| = \sqrt{2^2 + 1^2 + 4^2} = \sqrt{2} = 1.41421 \;\; \text{5.d.p}$$

$$|\vec{v}| = \frac{\vec{v}}{||\vec{v}||} = \frac{(2, 1, 4)}{1.41421} = (0.43644, 0.21822, 0.87287)$$

$$cos(\theta_0) = 0.92388$$

$$sin(\theta_0) = 0.38268$$

$$q_0 = (0.92388, 0.3)$$