


$$1. \cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$$

$$\cos\beta = \sqrt{1 - \cos^2\alpha - \cos^2\gamma} = \sqrt{1 - 0.5^2 - 0.5^2}$$

$$\cos\beta = 0.707 \quad \beta = 45^\circ$$

$$\begin{aligned}\vec{F} &= 500 \times \cos 120^\circ \vec{i} + 500 \times \cos 45^\circ \vec{j} + 500 \times \cos 60^\circ \vec{k} \\ &= -250 \vec{i} + 353.5 \vec{j} + 250 \vec{k}\end{aligned}$$

$$2. BE(4, 3, -2) \quad U_{BE} = \frac{4}{\sqrt{29}} \vec{i} + \frac{3}{\sqrt{29}} \vec{j} + \frac{2}{\sqrt{29}} \vec{k}$$

$$F_x = \frac{4}{5.39} \times 600 = 445.27 \text{ N}$$

$$F_y = \frac{3}{5.39} \times 600 = 334 \text{ N}$$

$$F_z = \frac{2}{5.39} \times 600 = 222.63 \text{ N}$$

$$DE = (0, 3, 0) \quad U_{DE} = \frac{0}{3} \vec{i} + \frac{3}{3} \vec{j} + \frac{0}{3} \vec{k}$$

$$F_{DE||} = 334 \times \frac{3}{3} = 334 \text{ N}$$

$$F_{DE \perp} = \sqrt{600^2 - 334^2} = 498 \text{ N}$$