A fixed screw eye is attached to three cables applying tension forces such that the wall experiences zero force.

If $\vec{F_1}$ and $\vec{F_2}$ have tensions of F_1 and F_2 respectively, find the magnitude of $\vec{F_3}$ and its unit vector.

$\Sigma F_x = 0 \rightarrow F_1 \cos \theta + F_{3x} = 0$

$\Rightarrow F_{3x} = -F_1 \cos \theta$

$\Sigma F_y = 0 \rightarrow F_1 \sin \theta + \frac{4}{5} F_2 + F_{3y} = 0$

$\Rightarrow F_{3y} = -F_1 \sin \theta - \frac{4}{5} F_2$

$\Sigma F_z = 0 \rightarrow \frac{3}{5} F_2 + F_{3z} = 0$

$\Rightarrow F_{3z} = -\frac{3}{5} F_2$

$||\vec{F_3}|| = \sqrt{F_{3x}^2 + F_{3y}^2 + F_{3z}^2}$

$$\widehat{u}_{F_3} = \frac{1}{||\vec{F_3}||} \cdot (F_{3x}\widehat{i} + F_{3y}\widehat{j} + F_{3z}\widehat{k})$$

$$\widehat{u}_{F_3} = \frac{1}{||\vec{F_3}||} \cdot (F_{3x}\widehat{i} + F_{3y}\widehat{j} + F_{3z}\widehat{k})$$