$P_x + Q_x = R_x$ $\quad P_y + Q_y = R_y$

Magnitude

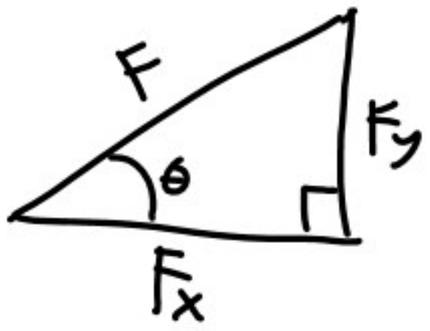
$F = \sqrt{F_x^2 + F_y^2}$

Direction

$\tan\theta = \frac{F_y}{F_x}$

$\sum \vec{F} = \vec{0}$ $\quad \sum F_x = 0$ $\quad \sum F_y = 0$

2.24 Determine the x and y components of each of the forces shown.



$$\cos\theta = \frac{F_x}{F}$$

$$F\cos\theta = F_x$$

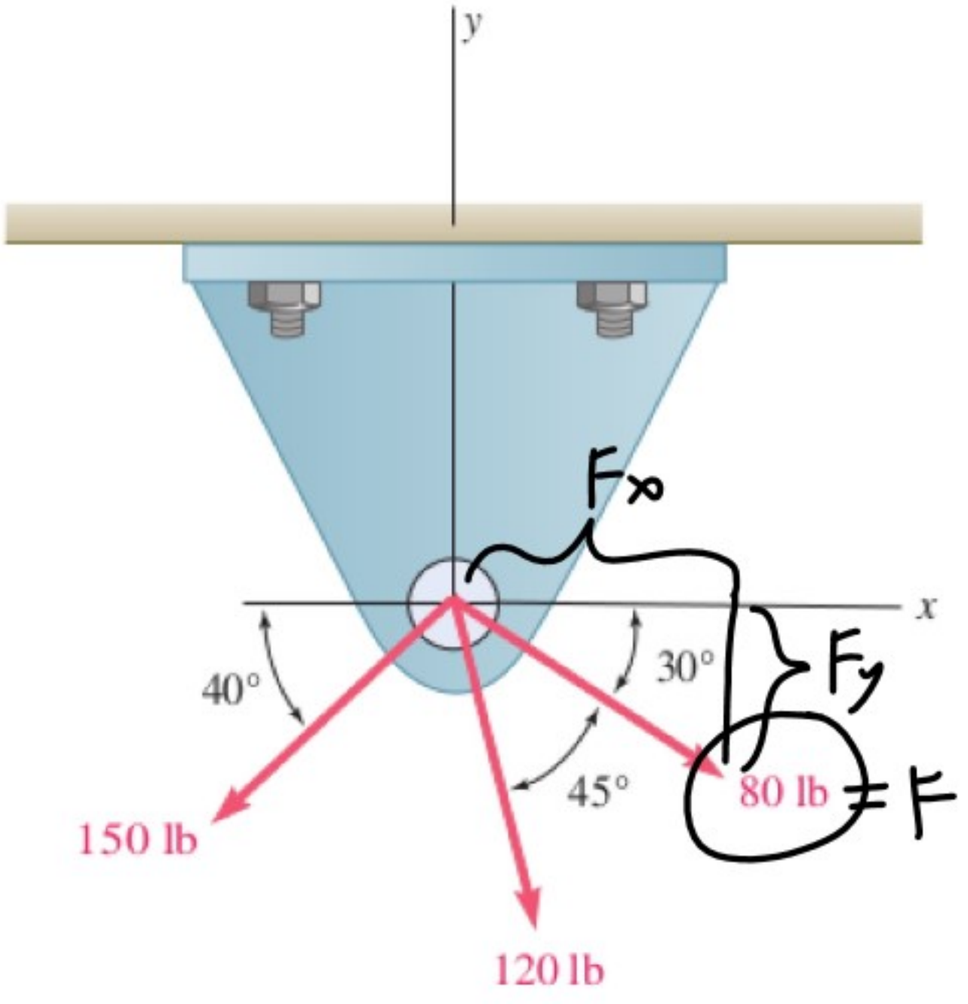


Fig. P2.24

$$F_x = F\cos 30$$
$$= 80\cos 30$$
$$= 69.28 \text{ lb}$$

$$F_y = F\sin 30$$
$$= 80\left(\tfrac{1}{2}\right)$$
$$= 40 \text{ lb}$$

$$F = \sqrt{40^2 + 69.3^2}$$
$$= 80 \text{ lb}$$

$$\theta = \tan^{-1}\frac{40}{69.28} = 30°$$

3D components

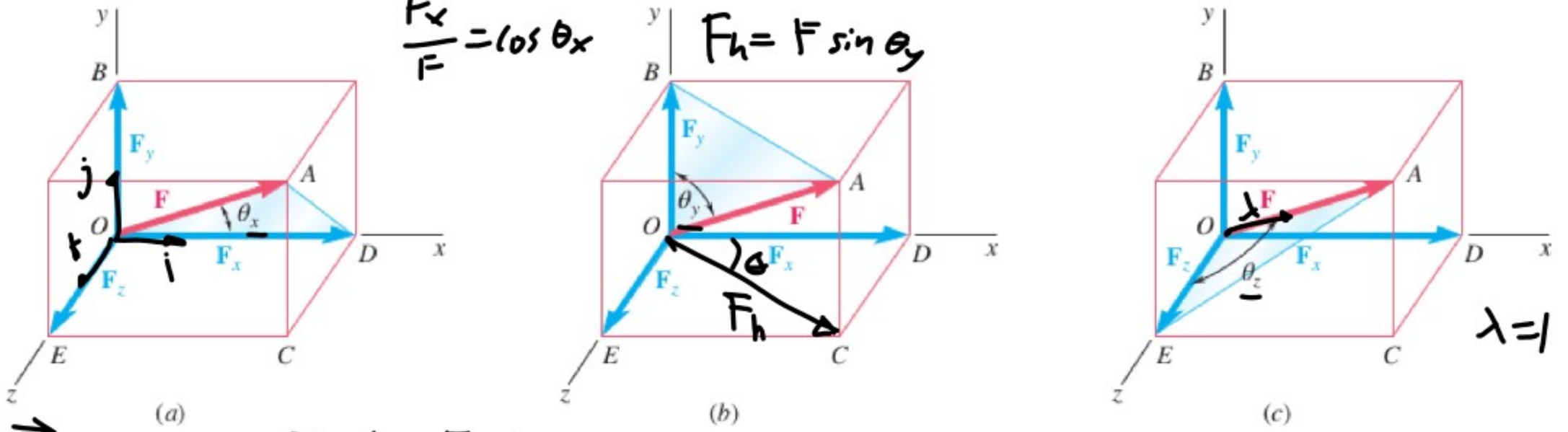
$F_x = F\cos\theta_x$

$\frac{F_x}{F} = \cos\theta_x$

$F_y = F\cos\theta_y$

$F_h = F\sin\theta_y$

$F_z = F\cos\theta_z$



$\lambda = 1$

$\vec{F} = F_x i + F_y j + F_z k$

$F = \sqrt{F_x^2 + F_y^2 + F_z^2}$

$\vec{\lambda} = \cos\theta_x i + \cos\theta_y j + \cos\theta_z k$

$\lambda_x = \cos\theta_x = \frac{F_x}{F}$

$\vec{\lambda} = \frac{F_x}{F} i + \frac{F_y}{F} j + \frac{F_z}{F} k$

$$\lambda_x^2 + \lambda_y^2 + \lambda_z^2 = 1$$

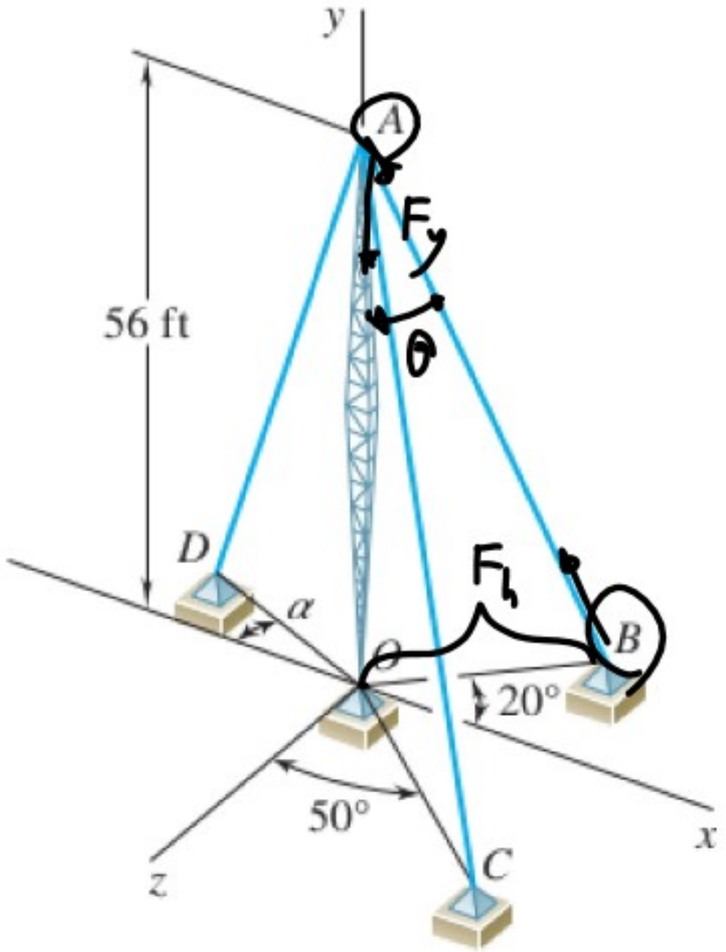
$$\cos^2\theta_x + \cos^2\theta_y + \cos^2\theta_z = 1$$

$$\vec{F} = F_x i + F_y j + F_z k = \langle F_x, F_y, F_z \rangle$$

$$i = \langle 1, 0, 0 \rangle$$
$$j = \langle 0, 1, 0 \rangle$$
$$k = \langle 0, 0, 1 \rangle$$

$$\vec{F} = \langle F_x, 0, 0 \rangle + \langle 0, F_y, 0 \rangle + \langle 0, 0, F_z \rangle$$
$$= \langle F_x, F_y, F_z \rangle$$

2.77 Cable AB is 65 ft long, and the tension in that cable is 3900 lb. Determine (a) the x, y, and z components of the force exerted by the cable on the anchor B, (b) the angles θ_x, θ_y, and θ_z defining the direction of that force.



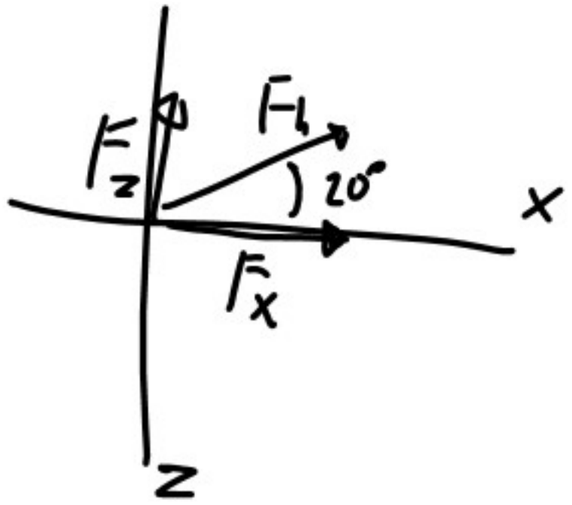


Fig. P2.77 and P2.78