b) Let \( \hat{j} \) point up. During the upward acceleration of the elevator car,

\[
F_{y\,\text{total}} = ma_y \implies N - (mg) = ma_y \implies m = \frac{N}{g + a_y} = \frac{600 \text{ N}}{9.81 \text{ m/s}^2 + 0.981 \text{ m/s}^2} = 55.6 \text{ kg}.
\]

c) Consider the elevator car and its contents to be the system. The forces on the system are

1. its weight \( \vec{w}' \), of magnitude \( m'g \), directed downward; and
2. the force \( \vec{T} \) of the cable on the system, directed up along the cable.

Let \( \hat{j} \) point up. Then

\[
F_{y\,\text{total}} = ma_y \implies T - (m'g) = m'a_y \implies T = m'(g + a_y) = (2.00 \times 10^3 \text{ kg})(9.81 \text{ m/s}^2 + 0.981 \text{ m/s}^2) = 2.16 \times 10^4 \text{ N}.
\]

d) The total force on the screw while it is falling is its weight \( \vec{w}'' \).

\[
\vec{w}'' = -m''g\hat{j} = -(3.00 \times 10^{-3} \text{ kg})(9.81 \text{ m/s}^2)\hat{j} = -(2.94 \times 10^{-2} \text{ N})\hat{j}.
\]

The force is entirely independent of whether the car is accelerating.

5.52 Consider the 30.0 kg mass to be the system. The only horizontal force is that of the cable. Let \( \hat{i} \) be in the horizontal direction of motion. Then \( F_{x\,\text{total}} = ma_x \) so

\[
0.900F = (30.0 \text{ kg})a_x. \tag{1}
\]

Now consider the massive cable as the system, with mass \( m' \). The horizontal forces on this system are

1. the applied force \( \vec{F} \), parallel to \( \hat{i} \); and
2. the force of the 30.0 kg mass on the cable, equal in magnitude to the force of the cable on the 30.0 kg (given as \( 0.900F \)), since they are a third-law force pair, and opposite in direction.

Thus,

\[
F_{x\,\text{total}} = m'a_x \implies F - 0.900F = m'a_x \implies a_x = \frac{0.100F}{m'}.
\]

Since the cable and 30.0 kg mass experience the same acceleration, substitute this expression for \( a_x \) in equation (1).

\[
0.900F = (30.0 \text{ kg})a_x = (30.0 \text{ kg})\frac{0.100F}{m'} \implies m' = 3.33 \text{ kg}.
\]

5.53 The forces on the anchor are:

1. its weight \( \vec{w} \);
2. the normal force \( \vec{N} \) of the surface on the anchor;
3. the applied horizontal force \( \vec{F} \), of magnitude 350 N; and
4. the maximum static force of friction \( \vec{f}_{s\,\text{max}} \), since the system is on the verge of slipping.

Since the mass is not accelerating, the total force on the system must be zero. Choose a coordinate system with origin on the mass, \( \hat{i} \) pointing to the right, and \( \hat{j} \) pointing up. In this case

\[
\begin{align*}
\text{x direction} & \quad \text{y direction} \\
F_{x\,\text{total}} = ma_x & \implies 350 \text{ N} - f_{s\,\text{max}} = 0 \text{ N} \\
& \implies f_{s\,\text{max}} = 350 \text{ N} \\
F_{y\,\text{total}} = ma_y & \implies N - mg = 0 \text{ N} \\
& \implies N = mg.
\end{align*}
\]

Since the system is on the verge of slipping, we have

\[
f_{s\,\text{max}} = \mu_s N = \mu_s mg \implies 350 \text{ N} = \mu_s(50 \text{ kg})(9.81 \text{ m/s}^2) \implies \mu_s = 0.71.
\]