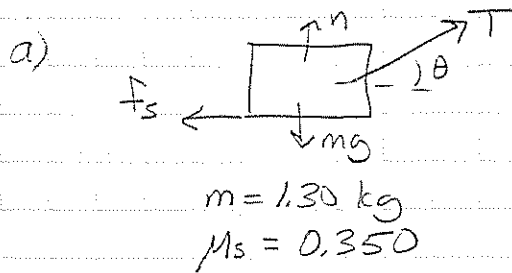


Ch. 5 problem 65



$$\Sigma F_x = \text{max}$$

$T \cos \theta - f_s = 0$ if toaster not moving
 just before toaster moves, $f_s = f_{s, \text{max}} = \mu_s N$

$$\Rightarrow T \cos \theta = \mu_s N$$

$$\Sigma F_y = m a_y$$

$$T \sin \theta + n - mg = 0 \rightarrow n = mg - T \sin \theta$$

$$\text{so } T \cos \theta = \mu_s mg - \mu_s T \sin \theta$$

$$\rightarrow T (\cos \theta + \mu_s \sin \theta) = \mu_s mg$$

to minimize T , maximize $\cos \theta + \mu_s \sin \theta$

$$\frac{d}{d\theta} (\cos \theta + \mu_s \sin \theta) = -\sin \theta + \mu_s \cos \theta = 0$$

$$\tan \theta = \mu_s \rightarrow \theta = 19.3^\circ$$

$$b) T = \frac{\mu_s mg}{\cos \theta + \mu_s \sin \theta} = 4.21 \text{ N}$$