1 Friction

1.1 Example 1

1.2 Example 2

$$\begin{aligned} \mu_R &= 0.1 \\ \mu_{\max} &= 0.3 \\ m &= 1\,\text{kg} \\ \theta &= 15^\circ \end{aligned}$$

What is the range of force values for which the system is static?

$$\begin{aligned} \sum F_x^{\min} &= 0 \\ N &= F_{\min}\sin(\theta) \end{aligned}$$

$$\begin{aligned} \sum F_y^{\min} &= 0 \\ f_{\min} + F_{\min}\cos(\theta) &= mg \\ \mu_{\max}(F_{\min}\sin(\theta)) + F_{\min}\cos(\theta) &= mg \\ F_{\min} &= \frac{mg}{\cos(\theta) + \mu_{\max}\sin(\theta)} \\ \therefore \quad F_{\max} &= \frac{mg}{\cos(\theta) - \mu_{\min}\sin(\theta)} \end{aligned}$$

1.3 Example 3

$$\begin{aligned} F &= ? \\ m_1 &= 10\,\text{kg} \\ \mu_k &= 0.1 \\ m_2 &= 5\,\text{kg} \\ \mu_{\max} &= 0.4 \\ a &= ? \end{aligned}$$