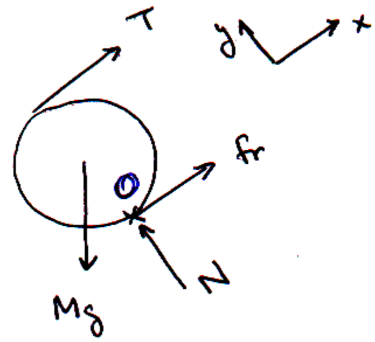
SOLUCIÓN EJERCICIO 14

DCL



(1 pto)

$$\sum \vec{F} = 0 \Rightarrow \quad \hat{x}) \quad T + fr - Mg\,\mathrm{sen}\,\theta = 0$$

$$\hat{y}) \quad N - Mg\cos\theta = 0 \qquad \text{(1 pto)}$$

$$\Rightarrow N = Mg\cos\theta$$

$\sum \vec{\tau} = 0$ (c/r al punto de contacto O)

$$2RT - MgR\,\mathrm{sen}\,\theta = 0$$

$$T = \frac{Mg}{2}\,\mathrm{sen}\,\theta \qquad \text{(1 pto)}$$

Entonces

$$fr = Mg\,\mathrm{sen}\,\theta - T \leq \mu_e N \qquad \text{(1 pto)}$$

$$\cancel{Mg}\,\mathrm{sen}\,\theta - \frac{\cancel{Mg}}{2}\,\mathrm{sen}\,\theta \leq \mu_e \cancel{Mg}\cos\theta$$

$$\tan\theta \leq 2\mu_e \Rightarrow \tan\theta_m = 2\mu_e \qquad \text{(1 pto)}$$

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Como $\cos^2\theta + \text{sen}^2\theta = 1 \Rightarrow \frac{1}{\tan^2\theta} + 1 = \frac{1}{\text{sen}^2\theta}$

$$\text{sen}\,\theta = \frac{\tan\theta}{\sqrt{1+\tan^2\theta}}$$

Por lo tanto

$$T = \frac{Mg}{2}\,\text{sen}\,\theta_m = \frac{Mg}{2}\,\frac{\tan\theta_m}{\sqrt{1+\tan^2\theta_m}}$$

$$\Rightarrow \boxed{T = \frac{\mu_e M g}{\sqrt{1+4\mu_e^2}}}$$ (1 pto)