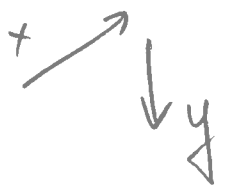
# Answers Exam 3 2016

2. $$a_x = \frac{m_2 g - m_1 g(\mu \cos\theta + \sin\theta)}{m_1 + m_2 + \frac{I}{R^2}}$$




3. $$\omega_f = \frac{\left(2m\left(\frac{s}{2}\right)^2 + I_R\right)\omega_0 - m v \frac{s}{2}\sin\theta}{m\left(\frac{s}{2}\right)^2 + I_R}$$

4. $$F = \sqrt{F_r^2 + F_\theta^2} = \mu N = \mu m g$$

$$\sqrt{m^2R^2\left(\frac{c_1^2 t^4}{4}\right)^2 + m^2 R^2 c_1^2 t^2} = \mu m g$$

Bonus: $$\frac{dR}{dt} = R_0 \cos\theta \, \frac{c_1 t^2}{2}$$

$$\frac{d^2R}{dt^2} = -R_0 \sin\theta \, \frac{c_1^2 t^2}{4} + R_0 \cos\theta \, c_1 t$$

$$F_r = m\left(\frac{d^2R}{dt^2} - R\omega^2\right)$$

$$F_\theta = m\left(2\frac{dR}{dt}\omega + R\alpha\right); \quad \omega = \frac{c_1 t^2}{2} \quad \alpha = c_1 t$$