Answers Exam 2 2017

1. $$\begin{cases} m_1 v_1 = m_1 \frac{v_1}{2}\cos\theta_1 + m_2 \frac{v_1}{2}\cos\theta_2 \\ 0 = m_1 \frac{v_1}{2}\sin\theta_1 - m_2 \frac{v_1}{2}\sin\theta_2 \end{cases}$$

$m_1 = m_2$, $\theta_1 = \theta_2$ $\cos\theta = 1$ $\theta = 0$

2. $$\begin{cases} T - m_1 g\sin\theta - \mu N_1 = m_1 a_x \\ N_1 - m_1 g\cos\theta = 0 \\ N_2 - T\sin\alpha = 0 \quad (\sin\alpha \approx \alpha) \\ m_2 g - T\cos\alpha - \mu N_2 = m_2 a_y \quad (\cos\alpha \approx 1) \\ a_x = a_y \quad (\text{small } \alpha) \end{cases}$$

3. $$-\mu_0(x_s - A)mg - \frac{\mu_0}{3L^2}(x_s^3 - A^3)mg - \frac{k x_s^2}{2} + \frac{k A^2}{2} = -\frac{m v_1^2}{2}$$

4. $$F_{2x} = -\frac{\partial U_2}{\partial x} = -(c_3 x^3 - 4 c_4 x^3)$$