Answers Exam 3 2012

2. a) $\mu = \dfrac{V_{max}^2}{gR}$

b) $\sqrt{\left(C_1 t + \dfrac{V_{max}}{2R}\right)^4 + C_1^2} = \dfrac{V_{max}^2}{R^2}$

c) $\vec{\tau}_{Grav} = Rmg\,\vec{i}_\theta$

$\vec{\tau}_N = RN\left(-\vec{i}_\theta\right)$

$\vec{\tau}_{fric} = RF_\theta(v_{hv}) = mR^2C_1\,\vec{i}_z$

3. $u_x = \dfrac{M_A V_A + M_B V_B \cos\Phi}{M_A + M_B}$

$u_y = \dfrac{M_B V_B \sin\Phi}{M_A + M_B}$

$u = \sqrt{u_x^2 + u_y^2}\,; \quad \tan\theta = \dfrac{u_y}{u_x}$

$KE_{final} = \dfrac{(M_A + M_B)u^2}{2}\,; \quad KE_{initial} = \dfrac{M_A V_A^2}{2} + \dfrac{M_B V_B^2}{2}$

$\Delta KE = KE_{final} - KE_{initial} < 0$

4. a) $\omega = \dfrac{m_C v_0 S}{m_B(S/2)^2 + (m_A + m_C)S^2}$; b) $\omega = \dfrac{3}{2}\,\dfrac{m_C v_0}{S\left(\frac{m_B}{4} + m_A\right)}$

c) $\omega = \dfrac{m_C v_0 S}{m_B\left(\frac{S}{2}\right)^2 + (m_A + m_C)S^2 + I}$