Answers Test 3_2006

2. a) $v_2 = \dfrac{v_1 \sin\theta_1}{2\sin\theta_2}$

b) $u = \dfrac{v_3}{2} - \dfrac{v_1\cos\theta_1}{6} - \dfrac{v_1 \sin\theta_1 \cot\theta_2}{6}$

3. a) $L = mD^2\omega_0$

or $L = mr^2\omega$ where $\omega = \dfrac{D^2\omega_0}{(D+k_1t^2)^2}$

b) $F_r = m\left(2k_1 - (D+k_1t^2)\omega^2\right)$

$F_\theta = m\left(4k_1t\omega + (D+k_1t^2)\alpha\right) = 0$

where $\omega = \dfrac{D^2\omega_0}{(D+k_1t^2)^2}$; $\alpha = -\dfrac{4D^2\omega_0 k_1 t}{(D+k_1t^2)^3}$

c) $\vec{\tau} = F_\theta (D+k_1t^2)(r\hat{r}) = 0$

d) $\omega = \dfrac{I + mD^2}{I + m(D+k_1t^2)^2}\,\omega_0$

4. 1) $\omega = \sqrt{\dfrac{kM_s}{R^3}}$; $U(R) - U(2R) = -\dfrac{kM_sM_p}{3}\left(\dfrac{1}{R^3} - \dfrac{1}{(2R)^3}\right)$