Honors Final - equations

Ch. 6

$\vec{p} = m\vec{v}$

$\vec{J} = \vec{F}\Delta t = m\Delta\vec{v} = \Delta\vec{p}$

$m_1\vec{v}_{1i} + m_2\vec{v}_{2i} = m_1\vec{v}_{1f} + m_2\vec{v}_{2f}$

Ch. 7

$s = r\theta$

$v = r\omega$

$a_t = r\alpha$

$\omega = 2\pi f$

$f = \frac{1}{T}$

$T = \frac{1}{f}$

$\omega_{av} = \frac{\Delta\theta}{\Delta t}$

$\alpha_{av} = \frac{\Delta\omega}{\Delta t}$

$\omega_f = \omega_i + \alpha t$

$\theta = \omega_i t + \frac{1}{2}\alpha t^2$

$\omega_f^2 = \omega_i^2 + 2\alpha\Delta\theta$

$\theta = \left(\frac{\omega_f + \omega_i}{2}\right)t$

$a_c = a_R = \frac{v^2}{r} = r\omega^2$

$F_R = \frac{mv^2}{r} = m\omega^2 r = ma_R$

$F_g = G\frac{m_1 m_2}{r^2} = mg$

$G = 6.67\times10^{-11}\frac{Nm^2}{C^2}$

$g = \frac{GM}{r^2}$

$v_{orb} = \sqrt{\frac{GM}{r}}$

Ch. 7 continued

$U_g = -\frac{GMm}{r}$ OR mgh at low "h"

$v_{esc} = \sqrt{\frac{2GM}{r}}$

$T^2 = \frac{4\pi^2}{GM}r^3$

$\frac{T^2}{r^3} = \text{constant}$

$\frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3}$

Ch. 8

$\tau = rF\sin\theta$

$x_{cm} = \frac{m_1x_1 + m_2x_2 + \cdots}{m_1 + m_2 + \cdots}$

$I = \Sigma mr^2 = m_1r_1^2 + m_2r_2^2 + \cdots$

$\Sigma\vec{\tau} = I\vec{\alpha}$

$L = I\omega \quad L = mvr \quad L = m\omega^2 r$

$L_i = L_f$

$I_i\omega_i = I_f\omega_f$

$\Sigma\tau = \frac{\Delta L}{\Delta t}$

$I_{ring} = mr^2 \quad I_{disc} = \frac{1}{2}mr^2$

$I_{sphere} = \frac{2}{5}mr^2 \quad I_{hollow\ sphere} = \frac{2}{3}mr^2$

$I_{bar\ end} = \frac{1}{3}ml^2 \quad I_{bar\ center} = \frac{1}{12}ml^2$

Ch. 13

$F_s = -kx$

$U_s = \frac{1}{2}kx^2$

$a = -\frac{k}{m}x$

$v = \pm\sqrt{\frac{k}{m}(A^2 - x^2)}$

$T = 2\pi\sqrt{\frac{m}{k}}$

$\omega = 2\pi f = \sqrt{\frac{k}{m}} = \frac{2\pi}{T}$

$x = A\cos(\omega t)$

$v = -A\omega\sin(\omega t)$

$a = -A\omega^2\cos(\omega t)$

$T = 2\pi\sqrt{\frac{l}{g}}$

$T = \frac{1}{f} \quad f = \frac{1}{T}$

Ch. 16

$C = \frac{Q}{V} \quad C = \frac{k\epsilon_0 A}{d}$

$\epsilon_0 = 8.85 \times 10^{-12}\ \frac{C^2}{Nm^2}$

$C_{eq} = C_1 + C_2 + \cdots$

$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$

$E = \frac{1}{2}QV = \frac{1}{2}CV^2 = \frac{Q^2}{2C}$

Ch. 17

$I = \frac{q}{t} \quad R = \frac{\Delta V}{i} \quad V = iR$

$P = iV \quad P = i^2R \quad P = \frac{V^2}{R}$

Ch. 18

$V = iR \quad P = iV = i^2R = \frac{V^2}{R}$

$R_{eq} = R_1 + R_2 + \cdots$

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$

$\tau = RC$

charging and discharging CAPS

$V = V_{max}\left(1 - e^{-\frac{t}{RC}}\right)$

$q = q_{max}\left(1 - e^{-\frac{t}{RC}}\right)$

$V = V_{max}\left(e^{-\frac{t}{RC}}\right)$

$q = q_{max}\left(e^{-\frac{t}{RC}}\right)$