Physics 10 Fall 2017

Equation Sheet for Final Exam, added $\vec{R}_{cm}$

Some constants:
$g = 9.8$ m/s^2 and $G = 6.67 \times 10^{-11} Nm^2/kg^2$.

Some useful formulas

From Exam 1:

$$\Delta\vec{r} \equiv \vec{r}_f - \vec{r}_i$$

$$\vec{v}_{AVE} \equiv \frac{\Delta\vec{r}}{\Delta t}$$

$$\vec{v} \equiv \frac{d\vec{r}}{dt}$$

$$\vec{a}_{AVE} \equiv \frac{\Delta\vec{v}}{\Delta t}$$

$$\vec{a} \equiv \frac{d\vec{v}}{dt}$$

$$\vec{v} = \vec{v_0} + \vec{a}t$$

$$\vec{r} = \vec{r_0} + \vec{v_0}t + \frac{1}{2}\vec{a}t^2$$

$$v^2 = v_0^2 + 2a(x - x_0)$$

$$v^2 = v_0^2 + 2\vec{a}\cdot\Delta\vec{r}$$

$$\Sigma\vec{F} = m\vec{a}$$

$$\vec{F}_{12} = -\vec{F}_{21}$$

$$\vec{F}_G = m\vec{g}$$

$$F_{fr} = \mu F_N$$

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

$$\omega = 2\pi f \qquad f = \frac{1}{T}$$

From Exam 2

$$F = G\frac{Mm}{r^2}$$

$$W \equiv \vec{F}\cdot\vec{d} = Fd_{//} = Fd\cos\theta$$

$$W_{net} = \Delta KE$$

$$KE \equiv \frac{1}{2}mv^2$$

$$\Delta PE \equiv -W_c$$

$$PE_g = mgh \qquad PE_s = \frac{1}{2}kx^2$$

$$F_s = -kx$$

$$E \equiv KE + PE$$

$$E_i + W_{nc} = E_f$$

$$P \equiv \frac{dW}{dt} \qquad P_{ave} \equiv \frac{\Delta W}{\Delta t}$$

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

$$\Sigma\vec{F} = \frac{d\vec{p}}{dt} \qquad \Sigma\vec{F}_{ave} = \frac{\Delta\vec{p}}{\Delta t}$$

$$X_{cm} = \frac{\Sigma x_i m_i}{M}$$

$$\vec{R}_{cm} = \frac{\Sigma\vec{r}_i m_i}{M}$$

$$a_t = r\alpha \qquad v = r\omega$$

$$\vec{\omega} = \vec{\omega}_0 + \vec{\alpha}t$$

$$\vec{\theta} = \vec{\theta}_0 + \vec{\omega}_0 t + \frac{1}{2}\vec{\alpha}t^2$$

$$\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$$

$$I \equiv \Sigma m_i r_i^2$$

$$KE = \frac{1}{2}I\omega^2$$

$$\vec{\tau} = \vec{r} \times \vec{F}$$

$$\tau = rF\sin\theta = r_\perp F$$

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

$$L = r_\perp p = rp\sin\theta$$

$$L = I\omega$$

New for Final

$$P = \frac{F}{A}$$

$$\Delta P = \rho g \Delta h$$

$$P = P_0 + \rho g h$$

$$F_x \propto -x \text{ or } a_x \propto -x$$

$$x = A\cos\omega t \text{ or } A\sin\omega t$$

$$v_{max} = \omega A \qquad a_{max} = \omega^2 A$$

$$E = \frac{1}{2}kA^2 = \frac{1}{2}mv_{max}^2$$

$$\omega^2 = \frac{k}{m} \text{ or } \frac{g}{L}$$

$$v = \lambda f$$

$$v = \sqrt{\frac{F_T}{\mu}}$$

$$y = A\cos\left(\frac{2\pi}{\lambda}x - \omega t\right) \text{ or }$$

$$A\sin\left(\frac{2\pi}{\lambda}x - \omega t\right)$$

$$f_n = n\frac{v}{2L} \text{ or } odd n\frac{v}{4L} = (2n-1)\frac{v}{4L}$$