Physics 10310 Exam #3 Formulas

$$g = 9.8\,\mathrm{m/s^2}$$

$$|\vec{B}| = \sqrt{B_x^2 + B_y^2 + B_z^2} \qquad \hat{i} = \hat{x}; \quad \hat{j} = \hat{y}; \quad \hat{k} = \hat{z} \qquad \vec{v}_{A,C} = \vec{v}_{A,B} + \vec{v}_{B,C}$$

$$\text{Constant } a_x: \quad x = x_0 + v_{0,x}t + \tfrac{1}{2}a_x t^2 \qquad v_x = v_{0,x} + a_x t \qquad v_x^2 = v_{0,x}^2 + 2a_x(x - x_0)$$

$$\vec{v} = \frac{d\vec{r}}{dt} = v_x\hat{i} + v_y\hat{j} + v_z\hat{k} = \frac{dx}{dt}\hat{i} + \frac{dy}{dt}\hat{j} + \frac{dz}{dt}\hat{k} \qquad \vec{a} = \frac{d\vec{v}}{dt} = a_x\hat{i} + \ldots = \frac{dv_x}{dt}\hat{i} + \ldots = \frac{d^2x}{dt^2}\hat{i} + \ldots$$

$$at^2 + bt + c = 0 \rightarrow \qquad t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}; \qquad \sum \vec{F} = \vec{F}_{\text{tot}} = m\vec{a} = \frac{d}{dt}\,\vec{p}_{\text{tot}}$$

$$W_{\text{on object}} = \int \vec{F}_{\text{on object}} \cdot d\vec{r} \qquad \Delta U = -W \qquad \Delta K = W \qquad \Delta U_{\text{gravity}} = mg\Delta h$$

$$\text{Power} = \vec{F} \cdot \vec{v} = \vec{\tau} \cdot \vec{\omega} = W/\Delta t \qquad F_{x,\text{ spring}} = -kx \qquad U_{\text{spring}} = \tfrac{1}{2}kx^2 \qquad \text{circular motion}: \quad F_{\text{in}} = \frac{mv^2}{r}$$

$$K_f + U_f = K_i + U_i + W_{\text{into system}} \qquad K_{\text{lin}} = \tfrac{1}{2}mv^2$$

$$|\vec{F}_{\text{kinetic friction}}| = \mu_k F_{\text{normal}} \qquad |\vec{F}_{\text{static friction}}| \leq \mu_s F_{\text{normal}}$$

$$\vec{p} = m\vec{v} \qquad \vec{J} = \Delta\vec{p} = \vec{p}_f - \vec{p}_i \qquad \vec{v}_{\text{c.m.}} = \frac{d\vec{r}_{\text{c.m.}}}{dt} \qquad \text{Elastic}: v_i + v_f = V_i + V_f$$

$$M_{\text{tot}}x_{\text{c.m.}} = \textstyle\sum_i m_i x_i \qquad \vec{p}_{\text{tot}} = M_{\text{tot}}\vec{v}_{\text{c.m.}} \qquad U_{\text{grav}} = M_{\text{tot}}g y_{\text{c.m.}} \qquad \vec{F}_{\text{net}} = \frac{d\vec{P}_{\text{c.m.}}}{dt}$$