Formula Sheet For PH 211 Final Exam

$$v_x = v\cos\theta \qquad v_y = v\sin\theta \qquad v = \sqrt{v_x^2 + v_y^2} \qquad \theta = \tan^{-1}(\frac{v_y}{v_x})$$

$$\vec{v}_{avg} = \frac{\Delta\vec{r}}{\Delta t} \qquad \vec{a}_{avg} = \frac{\Delta\vec{v}}{\Delta t} \qquad \vec{v} = \frac{d\vec{r}}{dt} \qquad \vec{a} = \frac{d\vec{v}}{dt} \qquad g = 9.80 \text{ m/sec}^2$$

$$\vec{s}_f = \vec{s}_i + \vec{v}_{is}\Delta t + \frac{1}{2}\vec{a}_s\Delta t^2 \qquad \vec{v}_{fs} = \vec{v}_{is} + \vec{a}_s\Delta t \qquad \vec{v}_{fs}^{\,2} = \vec{v}_{is}^{\,2} + 2\vec{a}_s\Delta\vec{s}$$

$$t_1 = \sqrt{\frac{2h}{g}} \qquad R_1 = v_i\sqrt{\frac{2h}{g}} \qquad t_2 = \frac{2v_i\sin\theta}{g} \qquad R_2 = \frac{v_i^2\sin 2\theta}{g} \qquad h_2 = \frac{v_i^2\sin^2\theta}{2g}$$

$$\vec{F}_{net} = \Sigma\vec{F} = 0 \qquad \vec{F}_{net} = \Sigma\vec{F} = m\vec{a} = \frac{d\vec{p}}{dt} \qquad a = g\sin\theta \qquad v = \sqrt{2gh}$$

$$\vec{F}_G = m\vec{g} \qquad F_{fk} = \mu_k F_N \qquad F_{fs} \le \mu_s F_N \qquad \vec{p} = m\vec{v}$$

$$K = \frac{1}{2}mv^2 \qquad U_g = mgy \qquad U_s = \frac{1}{2}k(\Delta s)^2 \qquad \vec{F}_{sp} = -k\Delta\vec{s} \qquad K_i + U_i = K_f + U_f$$

$$W = \int\vec{F}\cdot d\vec{s} \qquad W = \vec{F}\cdot\Delta\vec{r} \qquad W_{net} = \Delta K \qquad P = \frac{dE}{dt} = \vec{F}\cdot\vec{v} \qquad P_{avg} = \frac{\Delta E}{\Delta t} = \vec{F}\cdot\vec{v}_{avg}$$