## Formula Sheet For PH 211 Final Exam

$$v_x = v \cos \theta$$

$$v_{y} = v \sin \theta$$

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

$$\theta = \tan^{-1}(\frac{v_y}{v_x})$$

$$\vec{v}_{avg} = \frac{\Delta \vec{r}}{\Delta t}$$

$$\vec{a}_{avg} = \frac{\Delta \vec{v}}{\Delta t}$$

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

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

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

$$\vec{v}_{fs} = \vec{v}_{fs} + \vec{a}_s \Delta t$$

$$\vec{v}_{fs}^2 = \vec{v}_{is}^2 + 2\vec{a}_s \Delta \vec{s}$$

$$t_1 = \sqrt{\frac{2h}{g}}$$

$$R_{\rm i} = v_i \sqrt{\frac{2h}{g}}$$

$$t_2 = \frac{2v_i \sin \theta}{g}$$

$$R_2 = \frac{{v_i}^2 \sin 2\theta}{g}$$

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

$$\vec{F}_{net} = \Sigma \vec{F} = 0$$

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

$$a = g \sin \theta$$

$$v = \sqrt{2gh}$$

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

$$F_{fk} = \mu_k F_N$$

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

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

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

$$U_g = mgy$$

$$U_s = \frac{1}{2}k(\Delta s)$$

$$\vec{F}_{sp} = -k\Delta \vec{s}$$

$$K_i + U_i = K_f + U_j$$

$$W = \int \vec{F} \cdot d\vec{s}$$

$$W = \vec{F} \cdot \Delta \vec{r}$$

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

$$P = \frac{dE}{dt} = \vec{F} \cdot \vec{v}$$

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