Physics I - Final Exam
Equations

$R^2 = X^2 + Y^2$ $\qquad$ $\theta = \tan^{-1}(\frac{Y}{X})$

$\bar{v} = \frac{\Delta x}{\Delta t}$ $\qquad$ $\bar{a} = \frac{\Delta v}{\Delta t}$ $\qquad$ $\vec{p} = m\vec{v}$

<u>for constant a:</u>

$v = v_0 + at$ $\qquad$ $x = x_0 + v_0 t + \frac{1}{2}at^2$

$v^2 = v_0^2 + 2a(x - x_0)$ $\qquad$ $\bar{v} = \frac{1}{2}(v_0 + v)$

$\sum \vec{F} = m\vec{a} = \frac{\Delta \vec{p}}{\Delta t}$ $\qquad$ $\vec{F}_{ab} = -\vec{F}_{ba}$ $\qquad$ $\vec{F}_g = G\frac{m_1 m_2}{r^2}$

$F_{fr} = \mu_s F_N$ or $\mu_k F_N$ $\qquad$ $\vec{F}_s = -k\vec{x}$ $\qquad$ $a_R = \frac{v^2}{R}$

$W = Fd\cos\theta$ $\qquad$ $K.E. = \frac{1}{2}mv^2$

$PE_g = mgh$ $\qquad$ $PE_s = \frac{1}{2}kx^2$ $\qquad$ $\bar{P} = \frac{\Delta E}{\Delta t}$

$\bar{\omega} = \frac{\Delta \theta}{\Delta t}$ $\qquad$ $\bar{\alpha} = \frac{\Delta \omega}{\Delta t}$ $\qquad$ $L = I\omega$

$v = R\omega$ $\qquad$ $a = R\alpha$

<u>for constant α:</u>

$\omega = \omega_0 + \alpha t$ $\qquad$ $\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$

$\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$ $\qquad$ $\bar{\omega} = \frac{1}{2}(\omega_0 + \omega)$

$\vec{\tau} = RF\sin\theta$ $\qquad$ $\sum \vec{\tau} = I\alpha = \frac{\Delta L}{\Delta t}$ $\qquad$ $K.E. = \frac{1}{2}I\omega^2$

$\rho = \frac{M}{V}$ $\qquad$ $P = \frac{F}{A}$ $\qquad$ $F_b = \rho g V_d$ $\qquad$ $P + \frac{1}{2}\rho v^2 + \rho gh = const$

$\Delta L = \alpha L_0 \Delta T$ $\qquad$ $PV = Nk_B T$ $\qquad$ $\Delta E_{int} = Q - W$

$Q = mc\Delta T$ $\qquad$ Q = m L $\qquad$ $\Delta S = \frac{Q}{T}$

Constants

g = 9.81 m/s^2	G=6.7×10^{-11} $\mathrm{Nm^2/kg^2}$
$k_B = 1.38 \times 10^{-23} J/K$	0°C = 273.15K
1 atm = 1.013×10^5 Pa	ρ_{air} =1.27 $\mathrm{kg/m^3}$
ρ_w = 1000 $\mathrm{kg/m^3}$	c_w = 4186 J/(kg·°C)

Metric System

T = 10^{12}	G = 10^9	M = 10^6
k = 10^3	c = 10^{-2}	m = 10^{-3}
$\mu = 10^{-6}$	n = 10^{-9}	p = 10^{-12}