Phys 131a Spring '09 – Quiz 6 content

Chapter 9

stability problems

Equations given:

$v=\frac{\Delta x}{\Delta t}$ $a=\frac{\Delta v}{\Delta t}$ $x_f=x_0+v_0 t+\frac{1}{2}a t^2$ $v_f=v_0+a t$ $v_f^2-v_0^2=2a(x_f-x_0)$ $x_f-x_0=\frac{1}{2}(v_f+v_0)t$ $x_f=x_0+v_f t-\frac{1}{2}a t^2$

$\theta_f=\theta_0+\omega_0 t+\frac{1}{2}\alpha t^2$ $\theta_f=\theta_0+\omega_f t-\frac{1}{2}\alpha t^2$ $\omega_f=\omega_0+\alpha t$ $\omega_f^2=\omega_0^2=2\alpha(\theta_f-\theta_0)$ $\theta_f-\theta_0=\frac{1}{2}(\omega_f+\omega_0)t$ $x=x_{\tan}=\theta r$

$v=v_{\tan}=\omega r$ $a_{\tan}=\alpha r$ $a_c=\omega^2 r=\frac{v^2}{r}$ $\sum \boldsymbol{F}=m\boldsymbol{a}$ $F_g=G\frac{M m}{r^2}$ $G=6.673\times 10^{-11}\frac{\mathrm{N\ m}^2}{\mathrm{kg}^2}$ $\tau=I\alpha$ $\tau=r F_\perp$

$I_{\mathrm{other}}=I_{\mathrm{CM}}+md^2$ $I_{\textit{rod length l with axis through end}}=(1/3)ml^2$ $I_{\textit{rod length l;axis through middle}}=(1/12)ml^2$ $I_{\text{rectangle thru center}}=(1/12)m(a^2+b^2)$

$I_{\text{rectangle about edge b}}=(1/3)ma^2$ $I_{\textit{disk or cylinder}}=(1/2)mr^2$ $I_{\textit{ring or hoop}}=mr^2$ $I_{\textit{thick-walled hoop or cylinder}}=(1/2)m(r_1^2+r_2^2)$