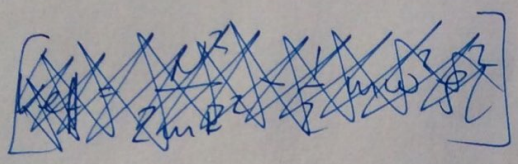
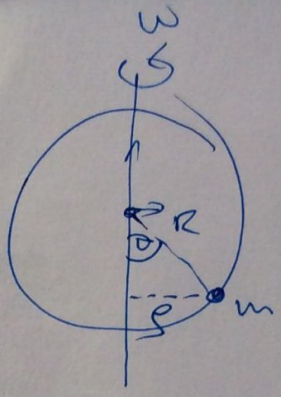
#1

$$V_{cf} = -\frac{1}{2} m\omega^2 \rho^2$$





1.) x, y

2.) geometriai.

3.) θ

4.)

$$x = R\sin\theta \qquad \dot{x} = R\dot{\theta}\cos\theta$$

$$y = -R\cos\theta \qquad \dot{y} = R\dot{\theta}\sin\theta$$

5.)

$$T = \frac{1}{2} m(\dot{x}^2 + \dot{y}^2) = \frac{1}{2} m R^2 \dot{\theta}^2$$

$$V = mgy - \frac{1}{2} m\omega^2 \rho^2 = -mgR\cos\theta - \frac{1}{2} m\omega^2 R^2 \sin^2\theta$$

$$L = T - V = \frac{1}{2} m R^2 \dot{\theta}^2 + \frac{1}{2} m\omega^2 R^2 \sin^2\theta + mgR\cos\theta$$

6.)

$$\frac{\partial L}{\partial \theta} = m\omega^2 R^2 \sin\theta\cos\theta - mgR\sin\theta$$

$$\frac{\partial L}{\partial \dot{\theta}} = mR^2\dot{\theta} \xrightarrow{d/dt} \frac{d}{dt}\frac{\partial L}{\partial \dot{\theta}} = mR^2\ddot{\theta}$$

$$mR^2\ddot{\theta} = m\omega^2 R^2 \sin\theta\cos\theta - mgR\sin\theta$$

$$\boxed{R\ddot{\theta} = (\omega^2 R\cos\theta - g)\sin\theta}$$

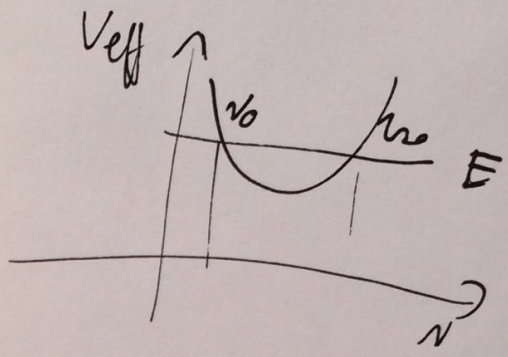
#2) $F = -br^3 \rightarrow V(r) = -\int_0^r -br'^3 dr' = +b\frac{r^4}{4}$

$V_{eff}(r) = \frac{N^3}{2mr^2} + b\frac{r^4}{4}$

$N = ?$ ismeretlen $\quad N_a = m 2\pi r_0 \omega_0$

$N = 2m r_0^2 \omega_0$

$E = \frac{1}{2} m \dot{r}^2 + V_{eff}(r)$



$\frac{1}{2} m \dot{r}^2 + \frac{(2mr_0^2\omega_0)^2}{2mr_0^2} + \frac{br_0^4}{4}$

$\|$

$\frac{1}{2} m (2r_0\omega_0)^2 + \frac{(2mr_0^2\omega_0)^2}{2m(2r_0)^2} + \frac{b(2r_0)^4}{4}$

$\frac{N^2}{2mr_0^2} + \frac{br_0^4}{4} = \frac{N^2}{2m4r_0^2} + \frac{16br_0^4}{4}$

$\frac{3}{8}\frac{N^2}{mr_0^2} = \frac{15}{4} br_0^4$

$r_0^6 = \frac{1}{10}\frac{N^2}{bm} = \frac{1}{10}\frac{2mr_0^2\omega_0}{bm}$

$$\boxed{N_0^4 = \frac{1}{5}\frac{\omega_0}{b}}$$