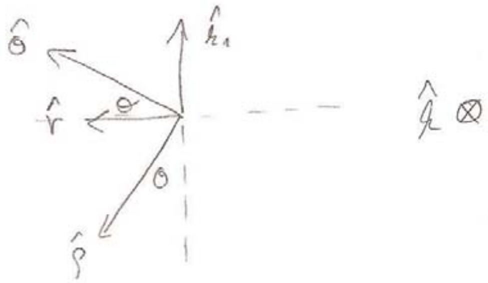
PAUTA P2 C3 2008-1

GABRIEL CUEVAS

a)	1 PT
b)	3 PT
c)	1 PT
d)	1 PT

$$\vec{a}_0 = -b\omega_0^2\,\hat{r}$$

$$\vec{r}\,' = L\hat{\rho}$$
$$\vec{v}\,' = L\dot{\theta}\,\hat{\theta}$$
$$\vec{a}\,' = -L\dot{\theta}^2\hat{\rho} + L\ddot{\theta}\,\hat{\theta}$$
$$\vec{\omega} = \omega_0\hat{k}_1$$



a) $N = 0$ (giro a ω cte) 1PT

$$\hat{k}_1 = -\hat{\rho}\cos\theta + \hat{\theta}\sin\theta$$
$$\hat{r} = \hat{\rho}\sin\theta + \hat{\theta}\cos\theta$$

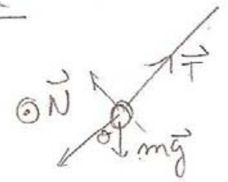
$$\vec{\omega} = \omega_0(-\cos\theta\,\hat{\rho} + \sin\theta\,\hat{\theta})$$
$$\vec{a}_0 = -b\omega_0^2(\sin\theta\,\hat{\rho} + \cos\theta\,\hat{\theta})$$

$$\vec{\omega}\times\vec{r}\,' = \omega_0(-\cos\theta\,\hat{\rho} + \sin\theta\,\hat{\theta})\times L\hat{\rho}$$
$$= -L\omega_0\sin\theta\,\hat{k}$$

$$\vec{\omega}\times\vec{\omega}\times\vec{r}\,' = \omega_0(-\cos\theta\,\hat{\rho} + \sin\theta\,\hat{\theta})\times(-L\omega_0\sin\theta\,\hat{k})$$
$$= -L\omega_0^2\cos\theta\sin\theta\,\hat{\theta} - L\omega_0^2\sin^2\theta\,\hat{\rho}$$

$$2\vec{\omega}\times\vec{v}\,' = 2\omega_0(-\cos\theta\,\hat{\rho} + \sin\theta\,\hat{\theta})\times L\dot{\theta}\,\hat{\theta}$$
$$= -2L\omega_0\dot{\theta}\cos\theta\,\hat{k}$$

<u>DCL</u>



$$\hat{\rho})\ -T + mg\cos\theta = m(-b\omega_0^2\sin\theta - L\dot{\theta}^2 - L\omega_0^2\sin^2\theta)$$
$$\hat{\theta})\ -mg\sin\theta = m(-b\omega_0^2\cos\theta + L\ddot{\theta} - L\omega_0^2\sin\theta\cos\theta)$$
$$\hat{k})\ -N = -2mL\omega_0\dot{\theta}\cos\theta$$

(2) $$-\frac{g}{L}\sin\theta + \frac{b}{L}\omega_0^2\cos\theta + \frac{\omega_0^2}{2}\sin 2\theta = \ddot{\theta}$$

$$\int_0^{\dot\theta} \dot\theta \, d\dot\theta = \int_0^{\theta}\left(-\frac{g}{L}\sin\theta + \frac{b}{L}\omega_0^2\cos\theta + \frac{\omega_0^2}{2}\sin 2\theta\right) d\theta$$

$$\frac{\dot\theta^2}{2} = -\frac{g}{L}(1-\cos\theta) + \frac{b}{L}\omega_0^2\sin\theta + \frac{\omega_0^2}{4}(1-\cos 2\theta)$$

$$\boxed{\dot\theta^2 = -\frac{2g}{L}(1-\cos\theta) + \frac{2b}{L}\omega_0^2\sin\theta + \frac{\omega_0^2}{2}(1-\cos 2\theta)}$$

$$\Rightarrow \boxed{N = 2mL\omega_0\left[-\frac{2g}{L}(1-\cos\theta) + \frac{2b}{L}\omega_0^2\sin\theta + \frac{\omega_0^2}{2}(1-\cos 2\theta)\right]^{1/2}\cos\theta}$$

d) Había que justificar $\cos\theta = 0 \vee \dot\theta = 0$