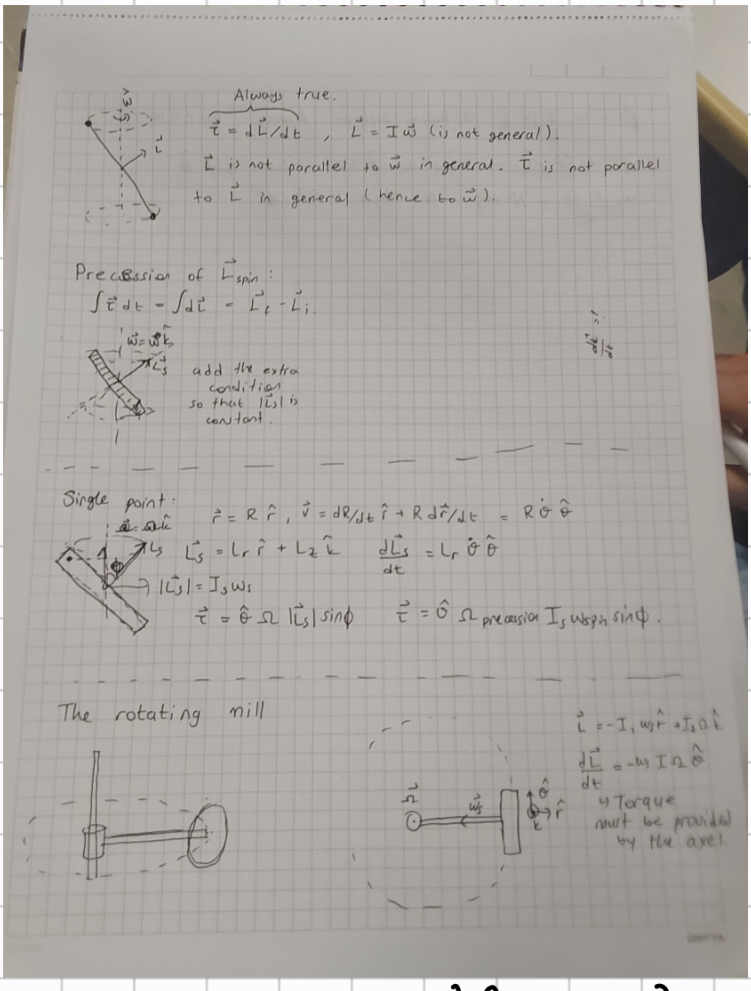
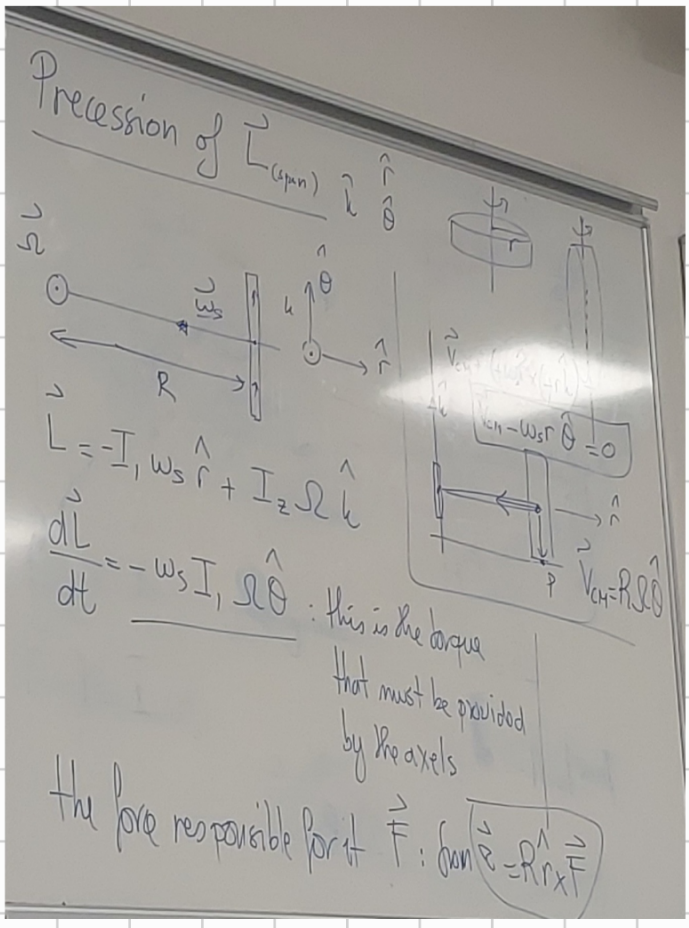
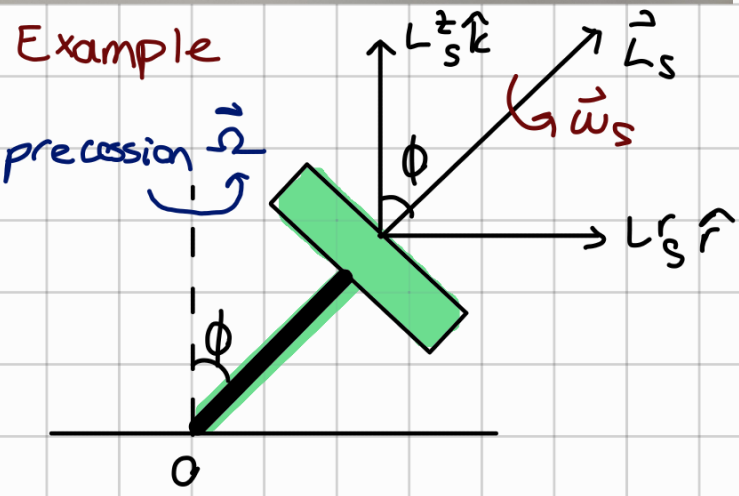
PHYS 301 Lecture 17

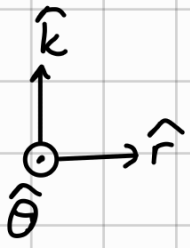
02.12.2024





Example





$$\frac{d\hat{k}}{dt} = 0$$

$$\vec{L} = \underbrace{|\vec{L}_S| \sin\phi \hat{r} + |\vec{L}| \cos\phi \hat{k}}_{\vec{L}_S} + \underbrace{|\vec{L}'| \hat{k}}_{\frac{d|\vec{L}|}{dt} = 0}$$

Remember!: This is not the solution for equations of motion!

We assume constant $|\vec{L}|$

$$\frac{d\vec{L}}{dt} = |\vec{L}_S| \sin\phi \frac{d\hat{r}}{dt} = |\vec{L}_S| \sin\phi \, \Omega \hat{\theta} : \tau_0$$

due to gravity

The Rotating Mill Cont.d.

$$\vec{r}_{cm} = d\cos\phi\,\hat{k} + d\sin\phi\,\hat{r}$$

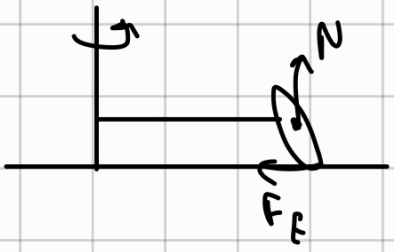
$$\vec{\tau}_o = \vec{r}_{cm} \times (-Mg\hat{k}) = Mg\sin\phi\,\hat{k}$$

$$|\vec{L}_s|\,\Omega = Mgd \qquad |\vec{L}_s| = I_s \omega_s$$

$$I_s \omega_s \Omega = Mgd \quad \text{not } \phi \text{ dependent!}$$

"Spin freq. is not dependent on precession angle"

Now you can solve:



Biker Problem