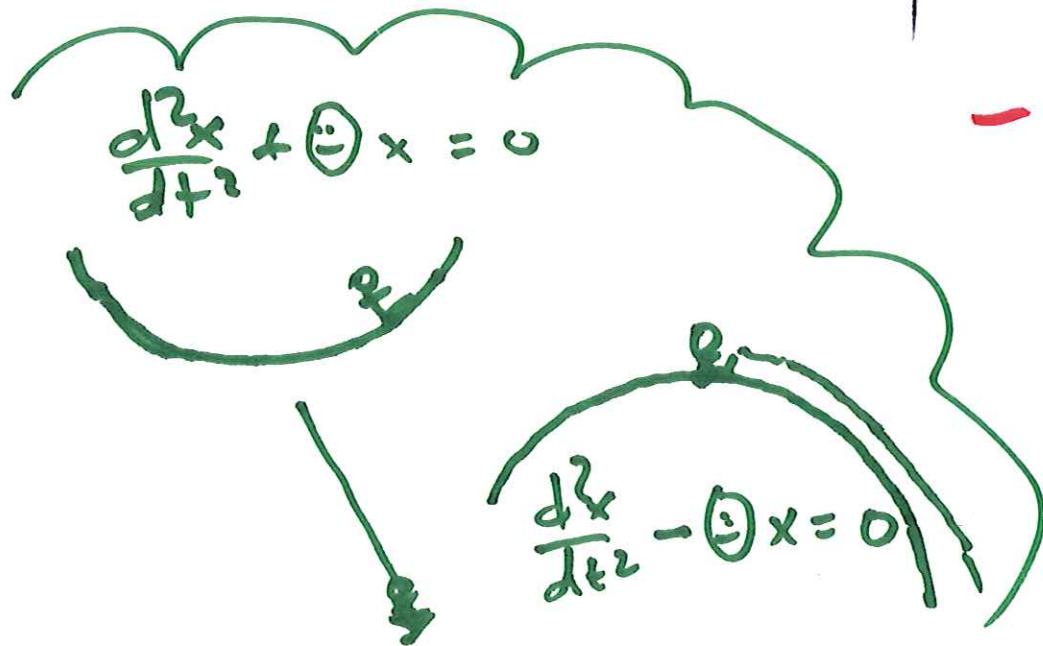


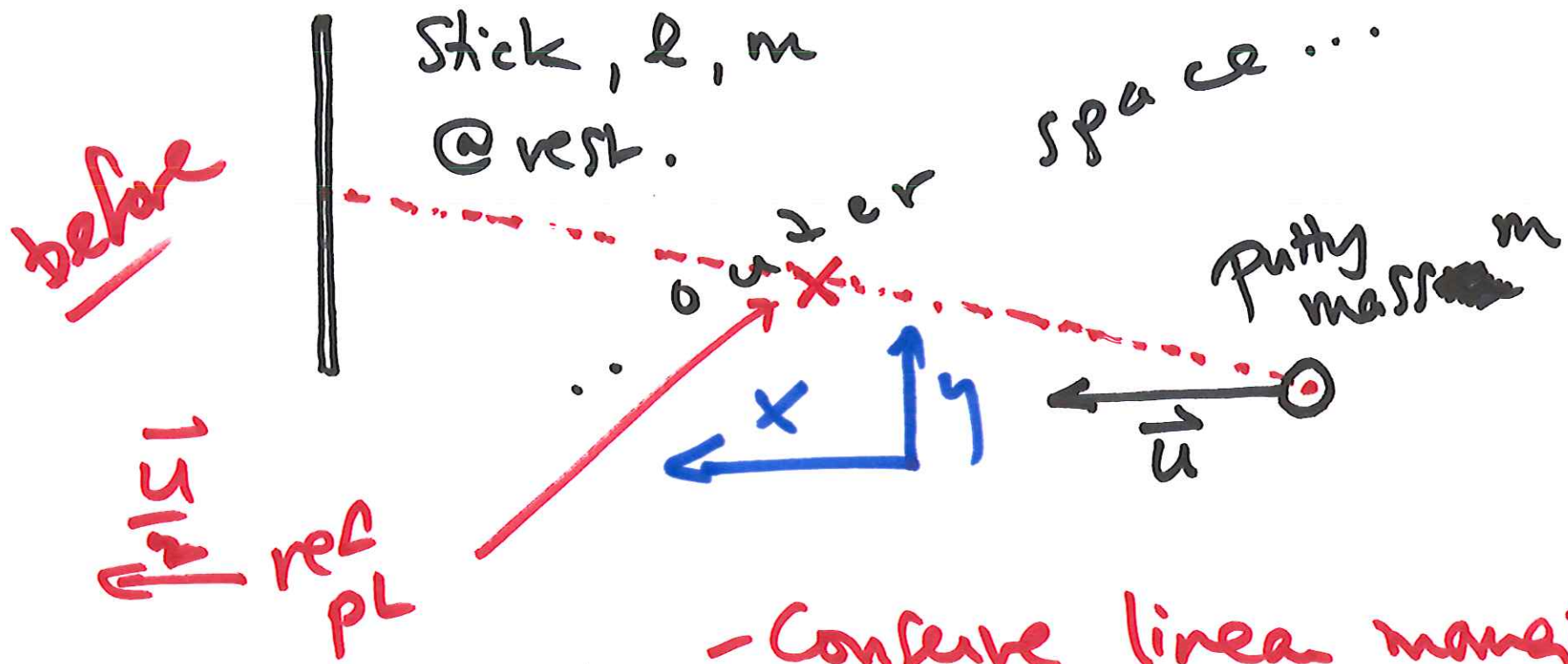
NVU Physics I

2018-11-13

- exam 4...
- Qs.
- collision.



- gravity = $\frac{GMm}{r^2}$
- angular momentum.
- orbit.
- pericenter
apocenter.



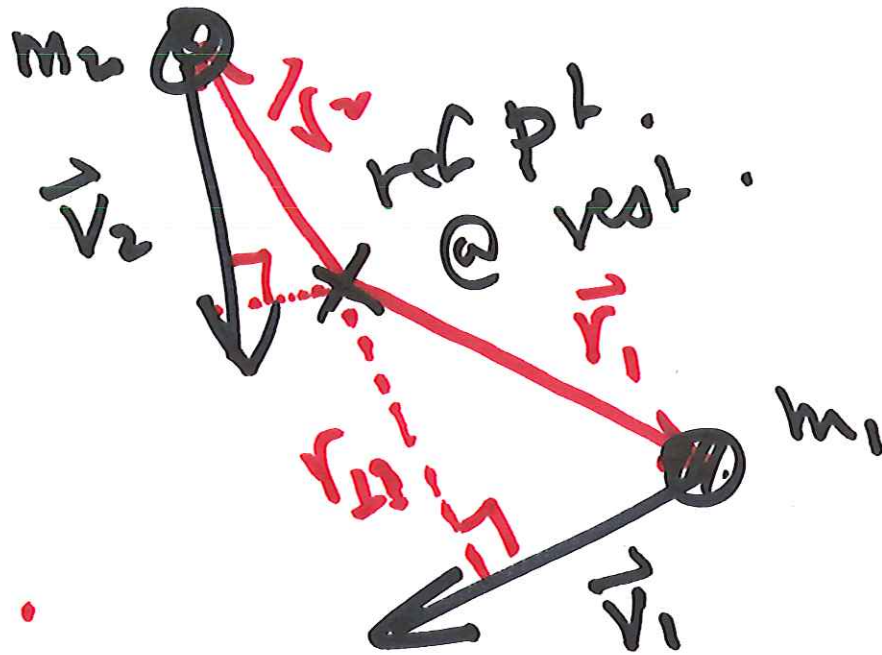
- Conserve linear momentum.
- conserve angular momentum



$$\left. \begin{aligned} \vec{P}_{\text{before}} &= m\vec{u} + \vec{0} \\ \vec{P}_{\text{after}} &= 2m\vec{v} \end{aligned} \right\} \vec{v} = \frac{\vec{u}}{2}$$

$$L_{\text{before}} = m \frac{l}{4} \frac{u}{2} + m \frac{l}{4} \frac{u}{2} = \frac{m u l}{4}$$

$$L_{\text{after}} = I_{\text{cm}} \omega_{\text{cm}}$$



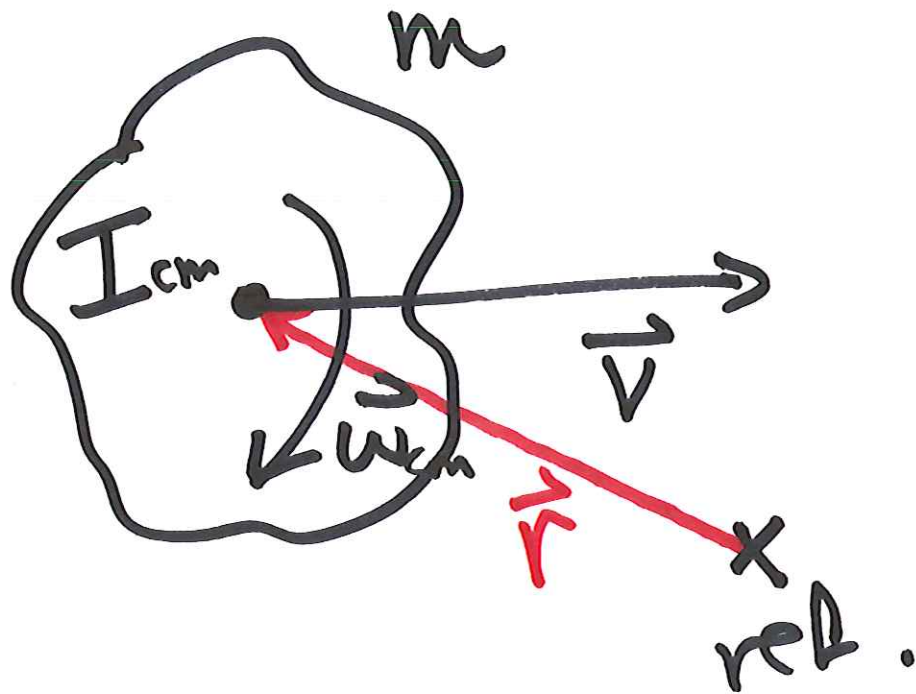
definition.

$$\vec{L} = m_1 \vec{r}_1 \times \vec{v}_1 + m_2 \vec{r}_2 \times \vec{v}_2$$

$$\vec{p} = m_1 \vec{v}_1 + m_2 \vec{v}_2$$

$$L = m_1 v_1 r_{\perp 1} - m_2 v_2 r_{\perp 2}$$

$$\left. \begin{aligned} L &= m \vec{r} \times \vec{v} ? \\ \vec{L} &= I \vec{\omega} ? \end{aligned} \right\}$$



$$\vec{L}_{total} = \underbrace{m \vec{r} \times \vec{v}}_{\text{Orbit}} + \underbrace{I_{cm} \vec{\omega}_{cm}}_{\text{Spin}}$$

motion of com.
motion around c.o.m