

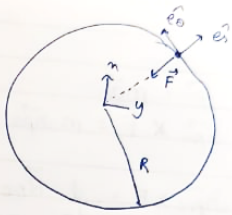
Problem 11

(a) Force law for speed independent of orbit radius

Q11. $\vec{r} = R\hat{e}_r$
 $\vec{v} = \frac{d\vec{r}}{dt} = R\dot{\theta}\hat{e}_\theta$
 $\vec{a} = \frac{d\vec{v}}{dt} = R\ddot{\theta}\hat{e}_\theta + R(\dot{\theta})^2\hat{e}_r$

$\vec{F} = -F(r)\hat{e}_r$
 Apply LMB
 $\vec{F} = m\vec{a}$
 $\Rightarrow -F(r)\hat{e}_r = m(R\ddot{\theta}\hat{e}_\theta + R(\dot{\theta})^2\hat{e}_r)$
 $\Rightarrow F(r) = mR(\dot{\theta})^2$
 $= \frac{mV^2}{R}$

for constant $V=c$, $F(r) = \frac{mc^2}{R}$ (Force is inversely proportional to Radius).



(b) I was not able to identify a periodic motion that was non-circular, however some interesting patterns showed up.

