Dragt 58 cont'd

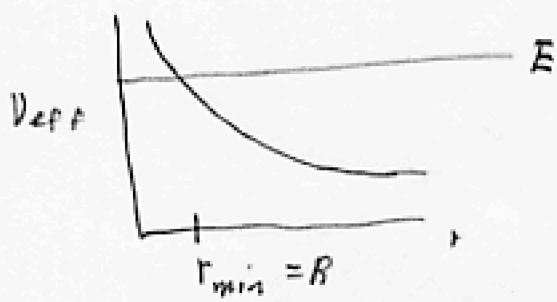
11/19

We have found the shape of the orbits. We still need to get them as functions of the time. From energy conservation we have

$$E = \frac{m}{2}(\dot{r})^2 + \frac{\sigma}{r^2} \quad \text{where} \quad \sigma = \frac{L^2}{2m} + \lambda. \Rightarrow$$

$$\dot{r}^2 = \frac{2E}{m} - \frac{2\sigma}{m}\frac{1}{r^2} \Rightarrow \boxed{\dot{r} = \sqrt{\frac{2E}{m} - \frac{2\sigma}{m}\frac{1}{r^2}}}$$

First suppose $\sigma > 0 \Rightarrow$



So in this case there is a turning point at $r = R$ where

$$\frac{2E}{m} = \frac{2\sigma}{m}\frac{1}{R^2}$$