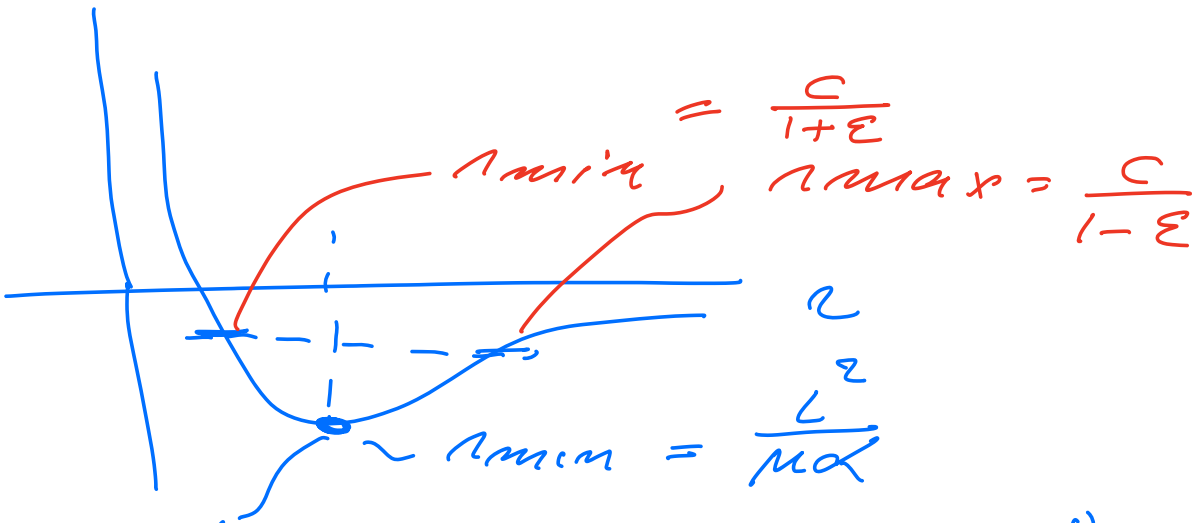
PHY 321, APRIL 8, MIDTERM DISCUSSIONS

$$\mu \ddot{r} = -\frac{dV}{dr} + \frac{L^2}{\mu r^3}$$



$$\frac{dV_{eff}}{dr} = 0 = -F(r) = -\mu\ddot{r}$$

$$\ddot{r} = 0$$

$$V(r) = -\frac{\alpha}{r}$$

$$\frac{d\phi}{dt} = \frac{L^2}{\mu r^2}\Big|_{r=r_{min}}$$

$$K = \frac{1}{2}\mu\dot{r}^2 + \frac{1}{2}r^2\dot{\phi}^2$$

at $r = r_{min}$ = constant

$$\frac{dA}{dt} = \frac{L}{2m} = \frac{1}{2m} |\vec{r} \times \vec{p}|$$

$$\vec{p} = m\vec{v}$$

$$\frac{L}{2m} = \frac{1}{2} |\vec{r} \times \vec{v}|$$

part 2

$$M_J = 1.9 \times 10^{27} kg$$

$$F_{EJ_x} = -\frac{G M_J M_E}{r_{EJ}^3} x_{EJ}$$

$$x_{EJ} = x_E - x_J$$

$$r_{EJ} = \sqrt{(x_E - x_J)^2 - (y_E - y_J)^2}$$

$$\frac{F_{Ex}}{M_E} = \frac{dv_{Ex}}{dt} = -\frac{G M_\odot x_E}{r^3}$$

$$- \frac{G M_J}{r_{EJ}^3} (x_E - x_J)$$

$$GM_\odot = 4\pi^2 (1\,AU)^3 / (1\,yr)^2$$

$$\mu = \frac{M_\odot}{M_\odot}$$

$$a_{EX} = -\frac{4\pi^2 x_E}{r^3} - 4\pi^2 \left(\frac{M_J}{M_\odot}\right) \frac{(x_E - x_J)}{r_{EJ}^3}$$