your name_____

Physics 321 In Class Exercise **(NOT GRADED)** - *Friday, Oct. 24*

1. Consider a particle of mass m in an attractive potential, $U(r) = -\alpha/r$, with angular momentum L with just the right energy so that

$$A = m\alpha/L^2$$

where A comes from the expression

$$r = \frac{1}{(m\alpha/L^2) + A\cos\theta}.$$

The trajectory can then be rewritten as

$$r = \frac{2r_0}{1+\cos\theta}, \quad r_0 = \frac{L^2}{2m\alpha}.$$

(a) Show that for this case the total energy E approaches zero.

(b) Write this trajectory in a more recognizable parabolic form,

$$x = x_0 - \frac{y^2}{R}.$$

I.e., express x_0 and R in terms of r_0.

(c) Explain how a particle with zero energy can have its trajectory not go through the origin.

(d) What is the scattering angle for this trajectory?