Problem 4(b)

We plotted the old and new orbits. For the new orbits, we plotted the case for $\epsilon = 0.8$, for both cases of applying impulse outward and inward.

The orbit equation for the new orbit is:

$$r(\theta) = \frac{\alpha}{1 + \epsilon \cos (\theta + \theta_0)}$$

Because at t=0, $\theta = 0$, and $r(\theta = 0) = \alpha = r_0$, θ_0 must be $\pm\pi/2$.

If $\theta_0 = \pi/2$, we will have the case that impulse is applied outward.

If $\theta_0 = -\pi/2$, we will have the case that impulse is applied inward.