Documentation

Q2

1

$$V = mgh_1 + mgh_2 = -mg\ell(2\cos\theta_1 + \cos\theta_2),$$

$$T = \tfrac{1}{2}mv_1^2 + \tfrac{1}{2}mv_2^2 = m\ell^2\left[\theta_1^2 + \tfrac{1}{2}\theta_2^2 + \theta_1\theta_2\cos(\theta_1 - \theta_2)\right],$$

Thus E=T+V to be

$$m\ell^2\left[\theta_1^2 + \tfrac{1}{2}\theta_2^2 + \theta_1\theta_2\cos(\theta_1 - \theta_2)\right] - mg\ell(2\cos\theta_1 + \cos\theta_2).$$

2 .2

just do the basic RK4 with 4 simultaneous equations and do the E+T+V

2.3

one wired thing is that if simply use code from 2.2 the r is not changing so I put it into a function and it generates the right Rs and then just do the animation, rate 450 seems to be a good rate for human to follow the motion and the motion is indeed chaotic.