

Galactic Dynamics AST1420

Problem Set 2

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Due: Tuesday, March 7th 2017, 1pm

For this problem set, please hand in printouts of the plots and your source code.

Problem 2.1

The logarithmic potential is defined as

$$\Phi_L(x, y) = \frac{1}{2}v_0^2 \ln \left(R_c^2 + x^2 + \frac{y^2}{q^2} \right).$$

For this problem we set $q = 0.9$, $R_c = 0.14$, and $v_0 = 1$. Through numerical experimentation, find initial conditions that lead to

- (a) Box orbits. These orbits have no particular sense of circulation about the centre and the time averaged angular momentum is zero.
- (b) Loop orbits. These kind of orbits have a fixed sense of circulation about the centre.

For each of the two cases, plot the (x, y) trajectory of the orbit.

Problem 2.2

Plot the (y, \dot{y}) , $(x = 0, \dot{x} > 0)$ surface of section for the two orbits of Problem 2.1.