Dynamical Invariants

radial action $i_r(E, j)$:

$$i_r(E, j) = \frac{1}{2\pi} \oint dr \; p_r$$

phase of revolution Φ:

$$\frac{\Phi}{2\pi} = 1 + k = -\frac{\partial}{\partial j} i_r(E, j)$$

orbital period P:

$$\frac{P}{2\pi G M} = \frac{\partial}{\partial E} i_r(E, j)$$