\[ V = -\frac{C}{2} (x_1^4 + x_2^4) \]

According to problem 3, the classical trajectories are given by:

\[ x_i (H \delta_{ij} - \frac{G}{r_{ij}^3}) x_j = \frac{m_i^4}{2} \quad (1) \]

\[ A_{ii} = 2E \quad A_{ij} = \frac{G}{r_{ij}} \]

We have to show that (1) represent a hyperbola with asymptotes through \( x_i = x_j = 0 \).

We only have to show that \( E \delta_{ij} - \frac{G}{r_{ij}} \) has one positive and one negative eigenvalue.

\[ \text{det}(E - \frac{G}{r_{ij}}; -\lambda) \Rightarrow \lambda^2 - \lambda (E + E_2) + E_1 E_2 \quad \frac{1}{2}(-2x_1 x_2 + p_1 p_2)^2 = 0 \]

\[ \Rightarrow -\frac{E}{2} (x_1 p_2 - x_2 p_1)^2 + \lambda^2 - \lambda (E_1 + E_2) = 0 \]

\[ E - \lambda = \frac{E_1 + E_2 \pm \sqrt{(E_1 + E_2)^2 + 4 (x_1 p_2 - x_2 p_1)^2}}{E} \]

Note:

\[ \Rightarrow \text{we have one positive and one negative eigenvalue} \]

For \( K > 0 \) \( x_i > 0 \) and \( K > 0 \); then ellipses.