$$\sum \frac{m_i m_j}{\|q_i - q_j\|} < \left(\sum_i \frac{m_i}{\|q_i\|^3}\right)\left(\sum_i m_i \|q_i\|^2\right)$$

$$U \qquad \mathcal{I} \qquad T$$

$$S.I = \sum_{i=1}^{3} \frac{m_i^2}{\|q_i\|} + \sum_{i<j} m_i m_j \left(\frac{\|q_i\|^2}{\|q_j\|^3} + \frac{\|q_j\|^2}{\|q_i\|^3}\right)$$

$x_0 = 0$, $x_1 = 1$, $x_2 = 1+r$ resuelve ec. euler

$m_0 = m_1 = 1$, $m_2 = 1+\varepsilon$

$g_i = x_i - c$ $\qquad c = \dfrac{1+(1+\varepsilon)(1+r)}{3+\varepsilon}$

$\boxed{1 < r < 1+\varepsilon}$

$$U = 1 + \frac{1+\varepsilon}{1+r} + \frac{1+\varepsilon}{r} < SI$$

$x < x$.

$f(x) < x$.

$f(x_1) > f(x_0) = x_1 \quad x_1 = f^2(x_1) > x_0 > f(x_1)$.

7/12 (2)

$$\frac{m_1^2}{|q_1|} + \frac{m_2^2}{|q_2|} + \frac{m_3^2}{|q_3|}$$

$$+ m_1 m_2 \frac{|q_1|^2}{|q_2|^3} + m_1 m_2 \frac{|q_2|^2}{|q_1|^3} + m_1 m_3 \frac{|q_1|^2}{|q_3|^3}$$

$$+ m_1 m_3 \frac{|q_3|^2}{|q_1|^3} + m_2 m_3 \frac{|q_2|^2}{|q_3|^3}$$

$$+ m_2 m_3 \frac{|q_3|^2}{|q_2|^3}$$

$$U = \frac{15}{2} + \frac{3}{2}\varepsilon$$ (3) Para acotar

$$\frac{m_2^2}{|q_2|} = \frac{1}{1-c} = \frac{3+\varepsilon}{|1-r(1+\varepsilon)|} = \cancel{3+\varepsilon}$$

$r < 1+\varepsilon$

$$\frac{3+\varepsilon}{r(1+\varepsilon)-1} > \frac{3+\varepsilon}{(1+\varepsilon)^2-1} \quad (1)$$

7/12 (3)

$$\frac{m_3^2}{|g_3|} = \frac{(1+\varepsilon)^2}{1+r-c} \ncong \frac{(1+\varepsilon)^2}{\frac{1+2r}{3+\varepsilon}} = \frac{(3+\varepsilon)(1+\varepsilon)^2}{1+2r}$$

$$\geq \frac{(3+\varepsilon)(1+\varepsilon)^2}{1+2(1+\varepsilon)} = \frac{(3+\varepsilon)(1+\varepsilon)^2}{3+2\varepsilon} \quad (2)$$

$$\frac{5}{2}+\frac{3}{2}\varepsilon < \frac{(3+\varepsilon)(1+\varepsilon)^2}{3+2\varepsilon} + \frac{7+\varepsilon}{(1+\varepsilon)^2-1}$$

$$f(3) = (3+\varepsilon)(1+\varepsilon)^2\left[(1+\varepsilon)^2-1\right]+(3+\varepsilon)(3+2\varepsilon)$$
$$-\left(\frac{5}{2}+\frac{3}{2}\varepsilon\right)(3+2\varepsilon)\left[(1+\varepsilon)^2-1\right]$$

$\varepsilon<1$

$$-\frac{15}{2}\varepsilon^2+9 > -7.5+9 > 1.5 \;!!$$

①

$-1<\varepsilon<0$

$$p(r) = 2r^5 + 5r^4 + 4r^3 - (1+3(1+\varepsilon))r^2 - (2+3(1+\varepsilon))r - (1+1+\varepsilon)$$

$$p(1) = 2 + 5 + 4 - 1 - 3 - 3\varepsilon - 2 - 3 - 3\varepsilon - 1 - 1 - \varepsilon$$

$$= -7\varepsilon > 0$$

$$p(1+\varepsilon) = \varepsilon\underbrace{(2\varepsilon^4 + 15\varepsilon^3 + 41\varepsilon^2 + 49\varepsilon + 22)}_{>0 \ \forall -1<\varepsilon<0} < 0$$

raíces: $-2,\ -\frac{11}{6}$ - - , i, i

$$\boxed{1 > r > 1+\varepsilon}$$

$$1 - r - \varepsilon r = 1 - (1+\varepsilon)r \geq 1 - (1+\varepsilon)^2 = 1 - (1 + 2\varepsilon + \varepsilon^2)$$

$$= -2\varepsilon - \varepsilon^2 = -\varepsilon(2+\varepsilon)$$

$1 > r > 1+\varepsilon$

$\varepsilon \leq \varepsilon r < \varepsilon(1+\varepsilon)$

$-\varepsilon > -\varepsilon r > -\varepsilon(1+\varepsilon)$

$$1 - r - \varepsilon > 1 - r - \varepsilon r > 1 - r - \varepsilon(1+\varepsilon) > 1 - 1 - \varepsilon(1+\varepsilon) = -\varepsilon(1+\varepsilon) > 0$$

$1 - r - \varepsilon r > 0$