Auxiliar 1

P1

$$x(t) = \frac{t^4}{16}\frac{k^3}{9} \quad , \quad \dot{x}(t) = \frac{t^3}{4}\frac{k^2}{9} \quad , \quad \ddot{x}(t) = \frac{t^2}{4}\frac{k^2}{3}$$

P2

$$\dot{x}(x) = \exp(-kx + \ln(v_0)) \quad , \quad \dot{x}(t) = \frac{1}{k}\ln(v_0 k t + 1)$$

P3

$$\vec{v}(x=x_0, y=y_0) = \left(\pm v_0 \sqrt{1 - \frac{4c^2x^2}{1+4c^2x^2}} \, , \, \pm v_0 \sqrt{\frac{4c^2x_0^2}{1+4c^2x_0^2}} \right)$$

(depende de la velocidad $\vec{v}_0$)