(d) (a) $\sum \vec{F} = m\vec{a}$

$\Leftrightarrow \vec{f_0} = m\vec{a}$

$\Leftrightarrow \vec{a} = \dfrac{\vec{f_0}}{m}$

$$\vec{v}(t) = \dfrac{f_0}{m} t + \vec{v_0}$$

$$\| \vec{v}(t) \| = - \dfrac{f_0}{m} t + v_0$$

$$x(t) = -\dfrac{1}{2} \dfrac{f_0}{m} + v_0 t$$

(b) $m\vec{a} = -\lambda \vec{v}$

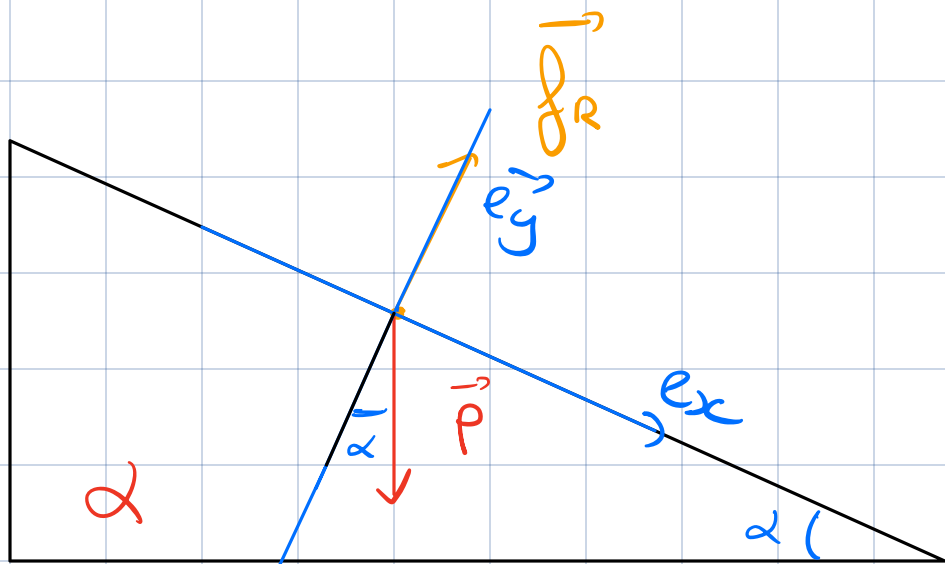$\Leftrightarrow m\dot{v} = -\lambda v$

$\Leftrightarrow$ sol forme expo.

$$\dot{v} = \dfrac{-\lambda}{m} v$$

$$\left(e^{-\frac{\lambda}{m}} \right)' = \dfrac{-\lambda}{m} e^{-\frac{\lambda}{m}}$$

$$r(t) = V_0 e^{-\frac{\lambda}{m}t}$$

$$x(t) = \frac{-m}{\lambda} V_0 e^{-\frac{\lambda}{m}t} + \frac{m}{\lambda} V_0$$

②

$$\sum \vec{F} = m\vec{a}$$

$$\Leftrightarrow \quad \vec{f_R} + \vec{P} = m\vec{a}$$

$$\Leftrightarrow \quad \cancel{f_R \vec{e_y}} \left(\cancel{- \cos\alpha \, \vec{e_y}} + \sin\alpha \, \vec{e_x} \right) m\vec{g} = m\vec{a}$$

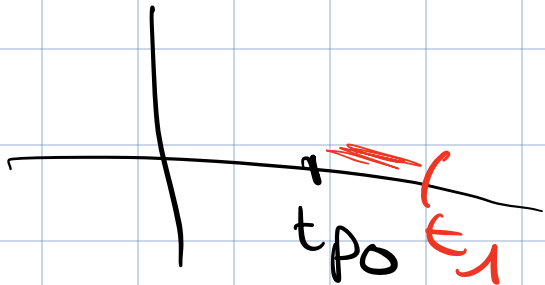$$\Leftrightarrow \quad \sin\alpha \, m\vec{g} \, \vec{e_x} = m\vec{a}$$

$$\Leftrightarrow \quad \vec{a} = \sin\alpha \, \vec{g} \, \vec{e_x}$$

③ Bille

$\vec{V_0}$ car
$$\begin{cases} V_{0y} = V_0 \cdot \sin\alpha \\ V_{0x} = V_0 \cdot \cos\alpha \end{cases}$$

t_{po} $(\epsilon_1$

$$\begin{cases} y(t) = V_0 \cdot \sin\alpha \cdot t \\ x(t) = V_0 \cdot \cos\alpha \cdot t \end{cases}$$

Paroi
$\vec{V_p}$
$$\begin{cases} V_{py} = V_0 \\ V_{px} = 0 \end{cases}$$

$$\begin{cases} y_p(t) = V_0 (t - t_{po}) \\ x_p(t) = L \end{cases}$$

$$\begin{cases} V_0 \cdot (t_r - t_{po}) = V_0 \cdot t_r \cdot \sin\alpha \\ L \qquad = V_0 \cdot t_r \cdot \cos\alpha \end{cases}$$

$$\Rightarrow \begin{cases} t_r = t_r \cdot \sin\alpha + t_{po} \\ t_r = \dfrac{L}{V_0 \cdot \cos\alpha} \end{cases}$$

$$\Rightarrow \begin{cases} t_r (1 - \sin\alpha) = t_{po} \\ t_r = \dfrac{L}{V_0 \cdot \cos\alpha} \end{cases}$$

$$\boxed{t_{po}} = \dfrac{L}{V_0 \cdot \cos\alpha} (1 - \sin\alpha)$$