Exercice 3

1 $\vec{v} \cdot \vec{e_z} = v_z = \dot{z} = v_0$

d'où $z(t) = v_0 \times t + C$ avec $C \in \mathbb{R}$.

CI. $z(t=0) = 0 = C$ (↑ origine) d'où $\boxed{z(t) = v_0 t}$

2 $\vec{v} \cdot \vec{e_x} = v_x = \dot{x} = \frac{z}{\tau} = \frac{v_0 t}{\tau}$

d'où $\boxed{\dot{x} = \frac{v_0 t}{\tau}}$

par intégration : $x(t) = \frac{1}{2} \frac{v_0 t^2}{\tau} + C_1$ avec $C_1 \in \mathbb{R}$

CI : $x(t=0) = 0 = C_1$

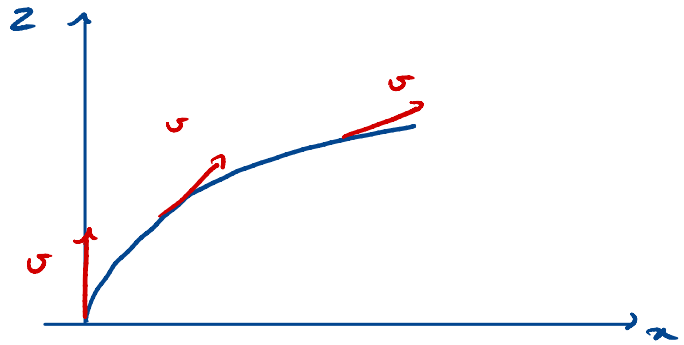
donc $\boxed{x(t) = \frac{1}{2} \frac{v_0 t^2}{\tau}}$

3 $t = \sqrt{\frac{2x\tau}{v_0}}$

dans $z = v_0 \sqrt{\frac{2x\tau}{v_0}} = \sqrt{2 v_0 x \tau}$

$\boxed{z(x) = \sqrt{2 v_0 x \tau}}$

4



5 $\vec{a} = a_x \vec{e_x} + a_y \vec{e_y} + a_z \vec{e_z}$

$\boxed{a_x = \ddot{x} = \frac{v_0}{\tau}}$

$\boxed{a_z = \ddot{z} = 0}$

6 $z(t_{1000}) = 1000\ m = v_0 \times t_{1000}$

$\Rightarrow t_{1000} = \frac{z_{1000}}{v_0}$

A.N. $t_{1000} = \frac{1000}{10} = 100\ s$

$x_{1000}(t_{1000}) = \frac{v_0 t_{1000}^2}{2\tau}$

A.N. $x_{1000} = \frac{10 \times (100)^2}{2 \times 100} = 500\ m$.