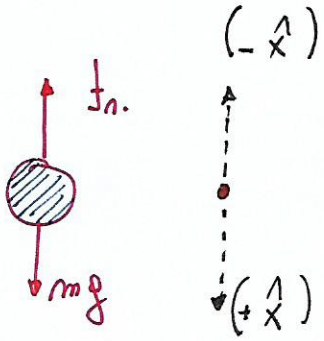
Pauta. Aux 9

P3) a)




$C_D = \frac{\sigma \omega}{\frac{1}{2}\rho V^2}$

$m = 12\ kgn$

$A = 0.6\ m^2$

$C_D = 0.8$

$\rho_{Aire} = 1.25\ kgn/m^3$.

$f_n = \frac{1}{2}\rho V^2 A C_D$.

Primero calculamos la velocidad a 2500 m.

$V = \sqrt{2g(H_1 - H_2)} = \sqrt{2g \times 500} \approx 99\ m/s$.

DCL

$mg - f_n = m\dot{v}$

$$\dot{v} + \frac{f_n}{m} = g.$$

Cambio de Variable.

$$\dot{v} = \frac{dv}{dt} = \frac{dv}{dx}\cdot\frac{dx}{dt} = \frac{dv}{dx}\cdot v$$

$$v\frac{dv}{dx} + \frac{\rho V^2 A C_D}{2m} = g.$$

S.p. $\frac{dV}{dx} \equiv 0. \Rightarrow$

$$V_p = \pm \sqrt{\frac{2mg}{\rho A C_D}}.$$

S. H.

$$\frac{V dV}{dx} = -\frac{\rho V^2 A C_D}{2m}$$

$$\frac{V dV}{V^2} = -\frac{\rho A C_D}{2m} dx \quad / \int C_1$$

$$\ln(V) = -\frac{\rho A C_D}{2m} x + C \quad / \exp C_1$$

$$V_H = A \exp\left(\frac{-\rho A C_D x}{2m}\right)$$

$$V = A \exp\left(\frac{-\rho A C_D x}{2m}\right) + \sqrt{\frac{2mg}{\rho A C_D}}$$

C. de borde.

$$V(x=0) = 99 \text{ m/s}.$$

$$\Rightarrow 99 = A + 48.49$$

$$\Rightarrow \boxed{A = 50.502 \text{ m/s}}$$

ahora, evaluando

$V(x = 2500)$ Tendremos la velocidad

con lo que llego al piso.

$$V_{\text{impl}} = 48.9989 \text{ m/s}.$$

El tipo se muere

# Pauta Aux 9

P3)

b)

$D = 30\ mm$

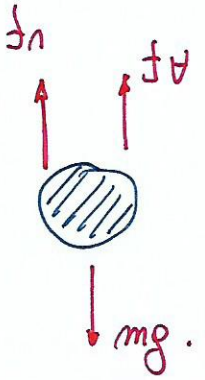
$V = 3\ m/s$

$\rho_f = 1890\ kg/m^3$

$C_D = 0.055$

$\rho_b$ ?

En efecto:




$$F_D = \frac{C_D \rho_f A V^2}{2}$$

$$F_A = \rho_f g \forall_b$$

Si Cae a $V = cte \Rightarrow \dot{V} = 0$. Luego solo tenemos que igualar las fuerzas.

$$\rho_f g \forall_b + \frac{C_D \rho_f A V^2}{2} = mg = \forall_b \rho_b g$$

$$A: \quad 4\pi R^2 = 0.0113\ m^2.$$

$$\forall_b = \frac{4}{3}\pi R^3 = 1.1309 \times 10^{-4}\ m^3.$$

$$\Rightarrow \boxed{\rho_b = 6659.41\ kg/m^3}$$