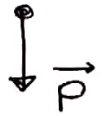
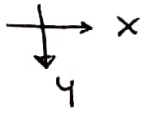
2) DCL de $t_0 = 0s$ a $t_1 = 5s$.



Sist. Coord



$$\Sigma \vec{F} = M \cdot \vec{a}$$

y) $P = M \cdot a_y$

$Mg = M \cdot a_y$ (donde $g = |\vec{g}|$)

$g = a_y$

$\Downarrow$

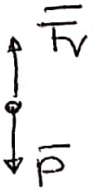
$\vec{a}$ = constante $\Rightarrow$ MRUV

$$\vec{V}(5s) = \vec{V}_1 = \vec{V}_0 + \vec{a}\,(t_1 - t_0) = g\,\hat{j} \cdot 5s = 50\,\frac{m}{s}\,\hat{j} = \vec{V}_1$$

($t_0 = 0$)

$= 0$ porque se deja caer

DCL desde $t_1 = 5s$ con $\vec{V}_1$



$$\Sigma \vec{F} = M \cdot \vec{a}$$

y) $P - F_v = M \cdot a_y$

$$Mg - k \cdot V_y = M \cdot \frac{dV_y}{dt}$$

$$dt = \frac{M}{Mg - kV_y}\, dV_y$$

$$\int_{t_1}^{t} dt = \int_{V_1}^{V} \frac{M}{Mg - kV_y}\, dV_y$$

$$t - t_1 = \int_{V_1}^{V} \frac{M}{Mg - kV_y}\, dV_y$$

(*)$_1$

(*) $$\int_{V_1}^{V} \frac{M}{Mg - kV_4}\, dV_4 = M \int_{V_1}^{V} \frac{1}{Mg - kV_4}\, dV_4$$

$x = Mg - kV_4$

$dx = -k\, dV_4$

$$= M \int_{x_1}^{x} \frac{1}{x} \cdot \left(-\frac{1}{k}\right) dx$$

$$= -\frac{M}{k} \int_{x_1}^{x} \frac{1}{x}\, dx = -\frac{M}{k} \ln|x| \Big|_{x_1}^{x}$$

$$= -\frac{M}{k} \left[\ln\left(|Mg - kV_4|\right) - \ln\left(|Mg - kV_1|\right)\right]$$

$$t - t_1 = -\frac{M}{k} \left[\ln\left(|Mg - kV_4|\right) - \ln\left(|Mg - kV_1|\right)\right]$$

Podría despejar $V_4(t)$ - como hicimos en clase

Pero en el ejercicio me piden calcular t cuando

$$V_4 = \frac{V_1}{2}$$

$$t = -\frac{M}{k} \left[\ln\left(|Mg - k\frac{V_1}{2}|\right) - \ln\left(Mg - kV_1\right)\right] + t_1$$

$$t = -\frac{80\,kg}{160\,kg/s} \left[\ln\left(|800\,N - 4000\,N|\right) - \ln\left(|800\,N - 8000\,N|\right)\right] + 5\,s$$

$$t = -0{,}5\,s \left[8{,}07 - 8{,}88\right] + 5\,s = 0{,}905\,s.$$