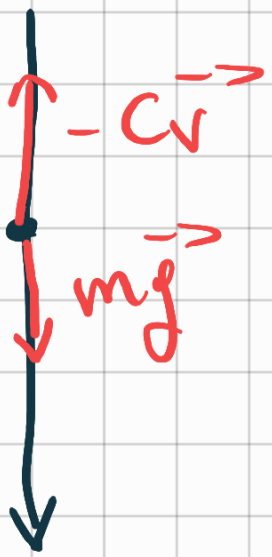
$$\vec{F} = m\vec{a}$$



$$\vec{F} = m\vec{g} + c\vec{v}$$

$$m\vec{g} + c\vec{v} = m\vec{a}$$

lungo asse y

$$mg - \frac{cv}{m} = ma \qquad \frac{m}{c} = \tau$$

$$g - \frac{v}{\tau} = a$$

$$g - \frac{v}{\tau} = \frac{dv}{dt}$$

Se non agisce forze peso

$$-\frac{V}{\tau} = \frac{dV}{dt}$$

$$-\frac{dt}{\tau} = \frac{dV}{V}$$

$$-1/\tau \int_{t_1}^{t_2} dt = \int_{V_1}^{V_2} \frac{dV}{V}$$

$$-1/\tau (t_2 - t_1) = \ln\left(\frac{V_2}{V_1}\right)$$

Ricavo V_2

se $t_1 = 0$

$$e^{-1/\tau (t_2 - t_1)} = \frac{V_2}{V_1}$$

$$V_2 = V_1 e^{-1/\tau}$$

RICAVO LO SPAZIO

$$x(t) = \int_{r_1}^{r_2} V(t)$$

$$g - \frac{V}{\tau} = \frac{dV}{dt}$$

$$g - \frac{V}{\tau} = K$$

costante

$$dK = d\left(g - \frac{V}{\tau}\right)$$

$$dK = d\left(-\frac{V}{\tau}\right)$$

$$dK = -\frac{1}{\tau} dV$$

$$-\tau\, dK = dV$$

SEPARAZIONE VARIABILI

$$\int dt = \int \frac{dV}{g - \frac{V}{\tau}}$$

ho sotto v quindi lo sposto

$$dV = -\tau\, dk \qquad g - \frac{V}{\tau} = k$$

$$\int_{t_1}^{t_2} dt = \int \frac{-\tau\, dk}{k}$$

i vecchi estremi sono

$V_1 = 0$ e V_2

nuovi estremi in k

$$g - \frac{V}{\tau} = K$$

se $V = V_1 = 0$ $\quad k = g$

Se $V = V_2$ $\qquad$ $K = g - \frac{V_2}{\tau}$

$$\int_{t_1}^{t_2} dt = \int_{g}^{g-\frac{V_2}{\tau}} -\frac{\tau\, dK}{K}$$

$$\int_{t_1}^{t_2} dt = -\tau \int_{g}^{g-\frac{V_2}{\tau}} \frac{dK}{K}$$

$$(t_2 - t_1) = -\tau \ln\left(\frac{g - V_2/\tau}{g}\right)$$

se $t_1 = 0$

$$t_2 = -\tau \ln\left(\frac{g - V_2/\tau}{g}\right)$$

$$-\frac{t_2}{\tau} = -\ln\left(\frac{g - V_2/\tau}{g}\right)$$

$$\tau \qquad 1 - \frac{g}{}$$

$$e^{-t_2/\tau} = \frac{g - v_2/\tau}{g}$$

$$g e^{-t_2/\tau} = g - v_2/\tau$$

$$g e^{-t_2/\tau} - g = -v_2/\tau$$

$$g(e^{-t_2/\tau} - 1) = -v_2/\tau$$

$$\tau g(-e^{-t_2/\tau} + 1) = v_2$$

$$x(t) = \int_{t_1}^{t_2} g\tau(1 - e^{t_2/\tau})\, dt$$

$$= \int g\tau - \int g\tau e^{-t_2/\tau}\, dt$$

$$\int_0^{t_1} \qquad \int_0^{t_2}$$

$$\int_0^{t_1} t \qquad g\tau \int_0^{t_2} e^{-t^2/\tau}\, dt$$

$$g\tau \int -\tau \; e^{t^2/\tau}\, dt$$

$$g\tau\left(-\tau e^{t^2/\tau} - \tau\right)$$

$$g\tau t_1 \; g\tau^2 e^{t^2/\tau} - g\tau^2$$