ECUACIONES DIFERENCIALES

JUAN ÚRSUL SOLANES

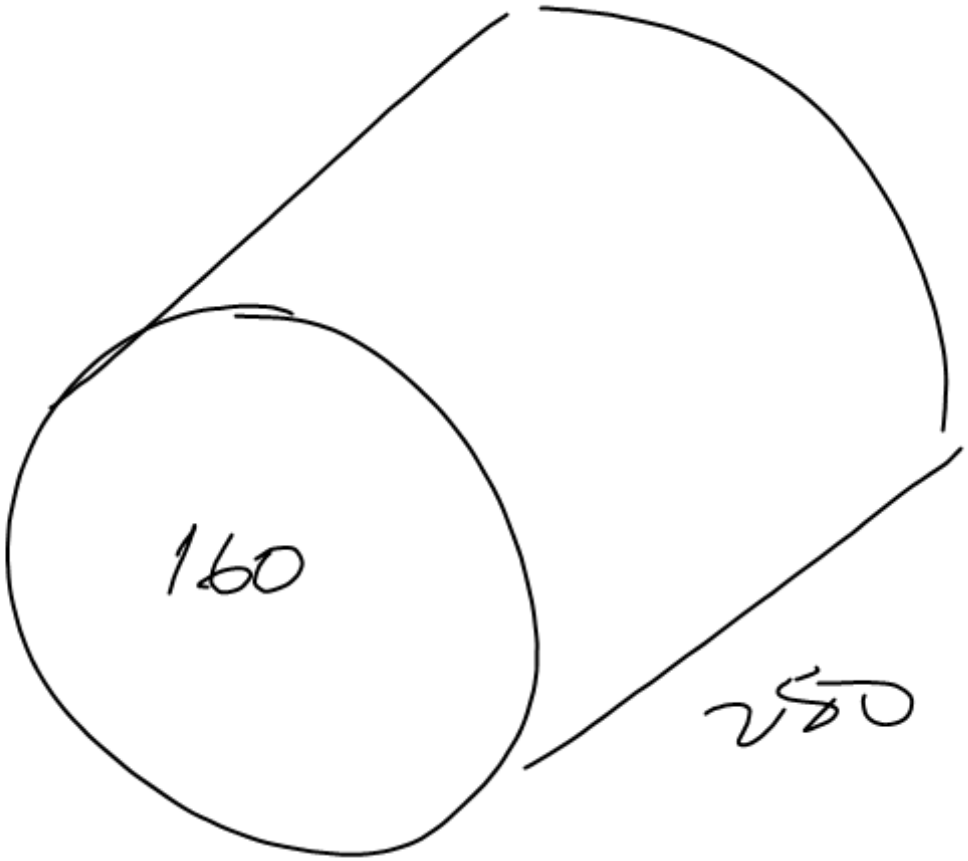
Ing. Mec. Elect. (Ing. Industrial)

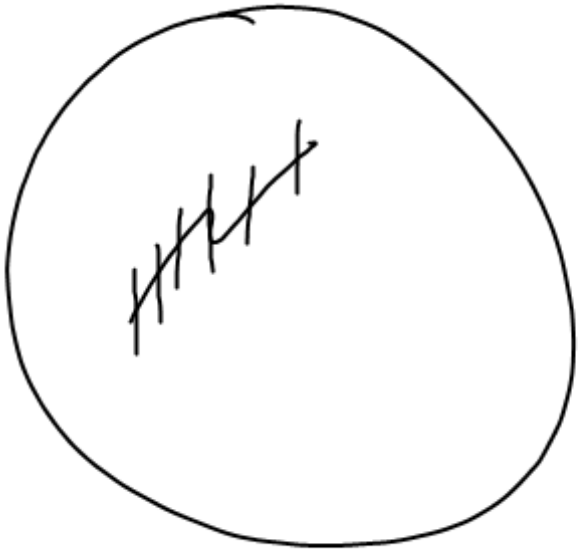
FI/UNAM. 68-72

MA – FCA. 43 años docencia

no envíen sus tareas ni series

a juan.ursulsolanes@gmail.com


160
250

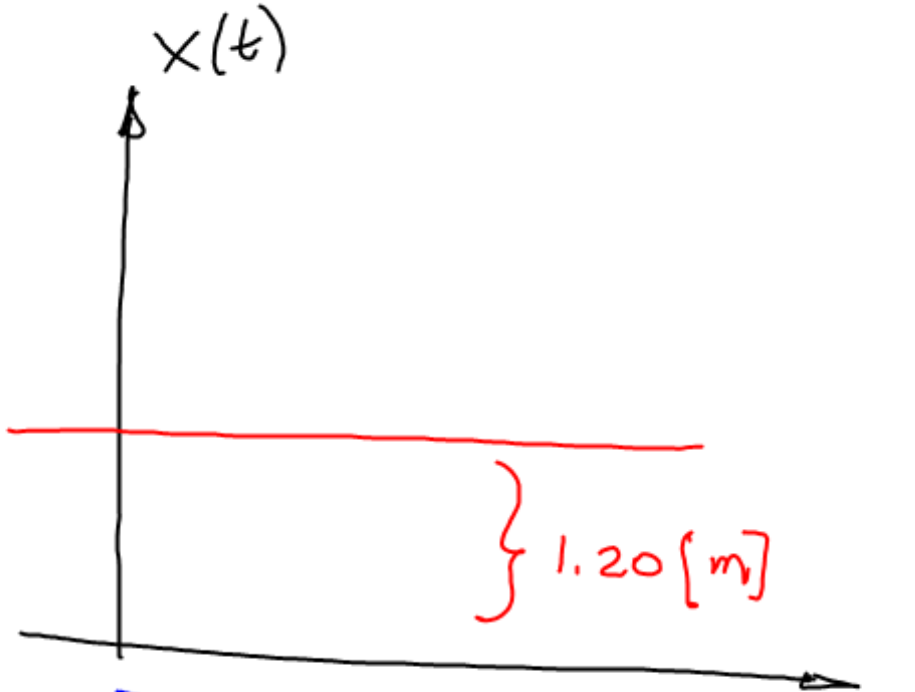


¡¡VALE LA PENA APRENDER A RESOLVER ED!!

$$F\left(x, y, \frac{dy}{dx}, \ldots\right) = 0$$

$y(x)$ incognita

Expresión matemática que tiene forma de ecuación y que contiene al menos una de las derivadas de una función desconocida llamada función incognita.



$$V(t) \Rightarrow \boxed{\frac{dx(t)}{dt} = 0}$$

$$X(t) = 1.20\ [m]$$

$$X(t) = C_1$$

$t = 0$

$\frac{dx(t)}{dt} = 2 \left[\frac{m}{s}\right]$ $\quad x(0) = 1.20\ [m]$

$t = 1\ [s]$

$d(x(t)) = 2\,dt$ $\quad x(1) = 3.20$

$t = 2\ [s]$

$\int d(x(t)) = 2\int dt$ $\quad x(2) = 5.20$

$x(t) + t_1 = 2(t + t_2)$

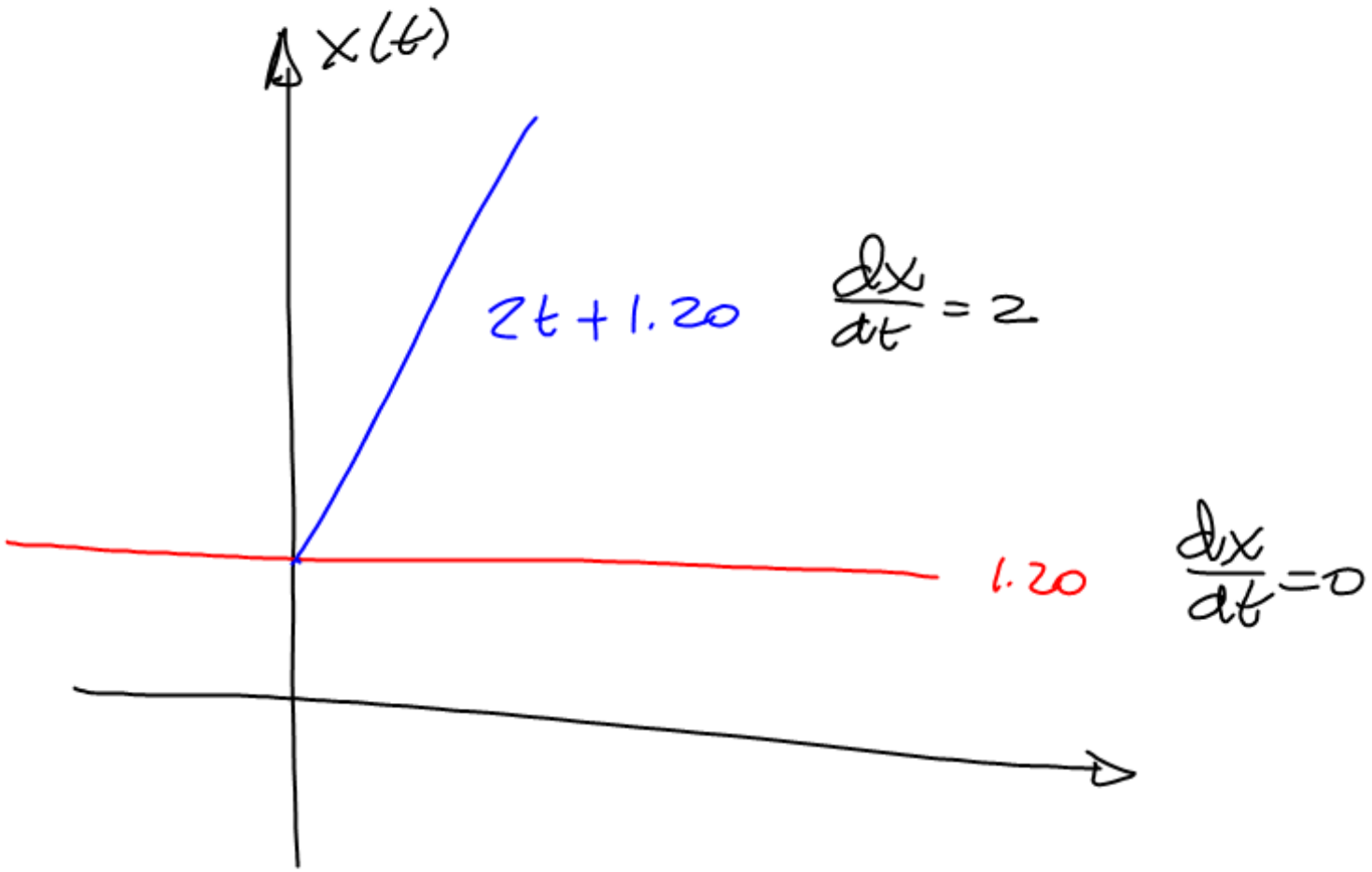
$x(t) = 2t + (2t_2 - t_1)$

$\boxed{x(t) = 2t + C_1}$ Solución general

$x(t)\Big|_{t=0} \Rightarrow 1.20 = 2(0) + C_1$

$C_1 = 1.20$

$\boxed{x(t) = 2t + 1.20}$ Solución particular


x(t)
2t + 1.20
dx/dt = 2
1.20
dx/dt = 0

$g = 9.8094$ 2269 m/SNM.

$$\frac{d^2y(t)}{dt^2} = -9.8094 \ \frac{m}{s^2} \qquad y(0) = 2.10 \qquad y'(0) = 0$$

$$\int d\left(\frac{dy}{dt}\right) = -9.8094 \int dt$$

$$\frac{dy}{dt} + k_1 = -9.8094\,(t + k_2)$$

$$\frac{dy}{dt} = -9.8094\,t + (9.8094 k_2 - k_1)$$

$$\frac{dy}{dt} = -9.8094\,t + C_1$$

$$\int dy = -9.8094 \int t\,dt + C_1 \int dt$$

$$y + k_3 = -9.8094\left(\frac{t^2}{2} + k_4\right) + C_1\,(t + k_5)$$

$$y = \frac{-9.8094}{2} t^2 + C_1 t + (9.8094 k_4 + C_1 k_5 - k_3)$$

$$y = -4.9047\,t^2 + C_1 t + C_2$$

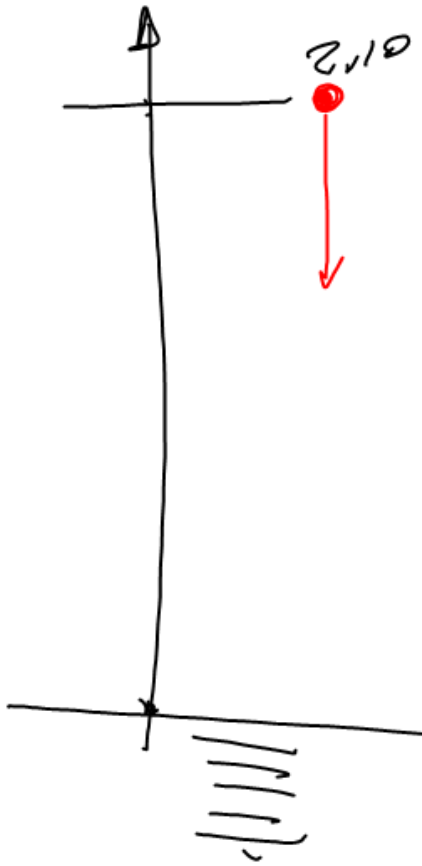
$$\frac{dy}{dt} = -9.8094\,t + C_1 \qquad y'(0) = 0$$

$$\left.\frac{dy}{dt}\right|_{t=0} \Rightarrow 0 = -9.8094(0) + C_1 \qquad \boxed{C_1 = 0}$$

$$y(t)\Big|_{t=0} \Rightarrow 2.10 = -4.9047(0) + C_2 \qquad \boxed{C_2 = 2.10}$$

$$\boxed{y(t) = -4.9047\,t^2 + 2.10}$$ Solución particular

$$\boxed{\frac{dy}{dt} = -9.8094\,t}$$



$t_{choque} = \quad y(t) = 0$

$y(t) = -4,9047t^2 + 2,10$

$-4.9047\,t^2 + 2,10 = 0$

$t = \pm\sqrt{\frac{-2,10}{-4,9047}}$

$t = \pm\, 0.6543\ [s]$

$\frac{dy}{dt} = -9.8094\,(0.6543)$

$V_{choque} = 6,41\ \frac{m}{s}$ 23 $\frac{km}{h}$