$t \ll \frac{m}{b} \longrightarrow$ Series de taylor

$$v(t) = -\frac{mg}{b}\left(1 - e^{-\frac{bt}{m}}\right)$$

$$e^{x} = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2} + \frac{x^3}{3!} + \dots$$

$$v(t) = -gt + \cancel{\frac{1}{2}\frac{bg}{m}t^2} \dots$$

$$v(t) = -gt \longrightarrow \text{Fisica } 1.$$

Realizar la misma aprox. para $x(t)$.

$$x(t) = -\frac{1}{2}gt^2$$

Ejemplo: (2.9 Thornton)

$$F(v) = 0 \longrightarrow t = \frac{v_0}{g}$$

$$F(v) = -bv$$

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

$$\int_{v_0}^{v} \frac{dv}{v+\frac{mg}{b}} = \int_0^t -\frac{b}{m}\,dt$$

$$\ln\left|\frac{\cancel{v}^{\,0}+\frac{mg}{b}}{v_0+\frac{mg}{b}}\right| = -\frac{bt}{m}$$

$$\ln\left|\frac{mg}{bv_0+mg}\right| = -\frac{bt}{m}$$

$$t = -\frac{m}{b}\ln\left|\frac{mg}{bv_0+mg}\right|$$

$$= \frac{m}{b}\ln\left|\frac{bv_0+mg}{mg}\right| = \frac{m}{b}\ln\left|1+\frac{bv_0}{mg}\right|$$

$$\boxed{\ln|1+x| = \sum_{n=1}^{\infty}(-1)^{n+1}\frac{x^n}{n}}$$

$$t = \cancel{\frac{m}{b}}\left(\cancel{\frac{bv_0}{mg}}\right)\left[1-\frac{1}{2}\left(\frac{v_0 b}{mg}\right)+\frac{1}{3}\left(\frac{v_0 b}{mg}\right)^2+\cdots\right]$$

$b \to 0$

$$t = \frac{v_0}{g} \quad \checkmark$$