

> restart

PROBLEMA NO LINEAL DE PLACA ANTI-PROYECTILES

> EcuacionInicial := diff(v(t), t) = -K·v(t)·2

$$\text{EcuacionInicial} := \frac{d}{dt} v(t) = -K v(t)^2 \quad (1)$$

> with(DEtools) :

> odeadvisor(EcuacionInicial)

[_quadrature] (2)

> CondicionInicial := v(0) = 200

$$\text{CondicionInicial} := v(0) = 200 \quad (3)$$

> Solucion₁ := dsolve({EcuacionInicial, CondicionInicial})

$$\text{Solucion}_1 := v(t) = \frac{200}{1 + 200 K t} \quad (4)$$

> EcuacionDerivada := diff(r(t), t) = rhs(Solucion₁)

$$\text{EcuacionDerivada} := \frac{d}{dt} r(t) = \frac{200}{1 + 200 K t} \quad (5)$$

> CondicionPrimera := r(0) = 0

$$\text{CondicionPrimera} := r(0) = 0 \quad (6)$$

> Solucion₂ := dsolve({EcuacionDerivada, CondicionPrimera})

$$\text{Solucion}_2 := r(t) = \frac{\ln(1 + 200 K t)}{K} \quad (7)$$

> Parametro := isolate(subs(t = t_{final}, rhs(Solucion₂) = 1/10), t_{final})

$$\text{Parametro} := t_{\text{final}} = \frac{1}{200} \frac{e^{\frac{1}{10} K} - 1}{K} \quad (8)$$

> ParametroFinal := isolate(subs(t = rhs(Parametro), rhs(Solucion₁) = 80), K)

$$\text{ParametroFinal} := K = 10 \ln\left(\frac{5}{2}\right) \quad (9)$$

> Solucion₁₀ := subs(K = rhs(ParametroFinal), Solucion₁)

$$\text{Solucion}_{10} := v(t) = \frac{200}{1 + 2000 \ln\left(\frac{5}{2}\right) t} \quad (10)$$

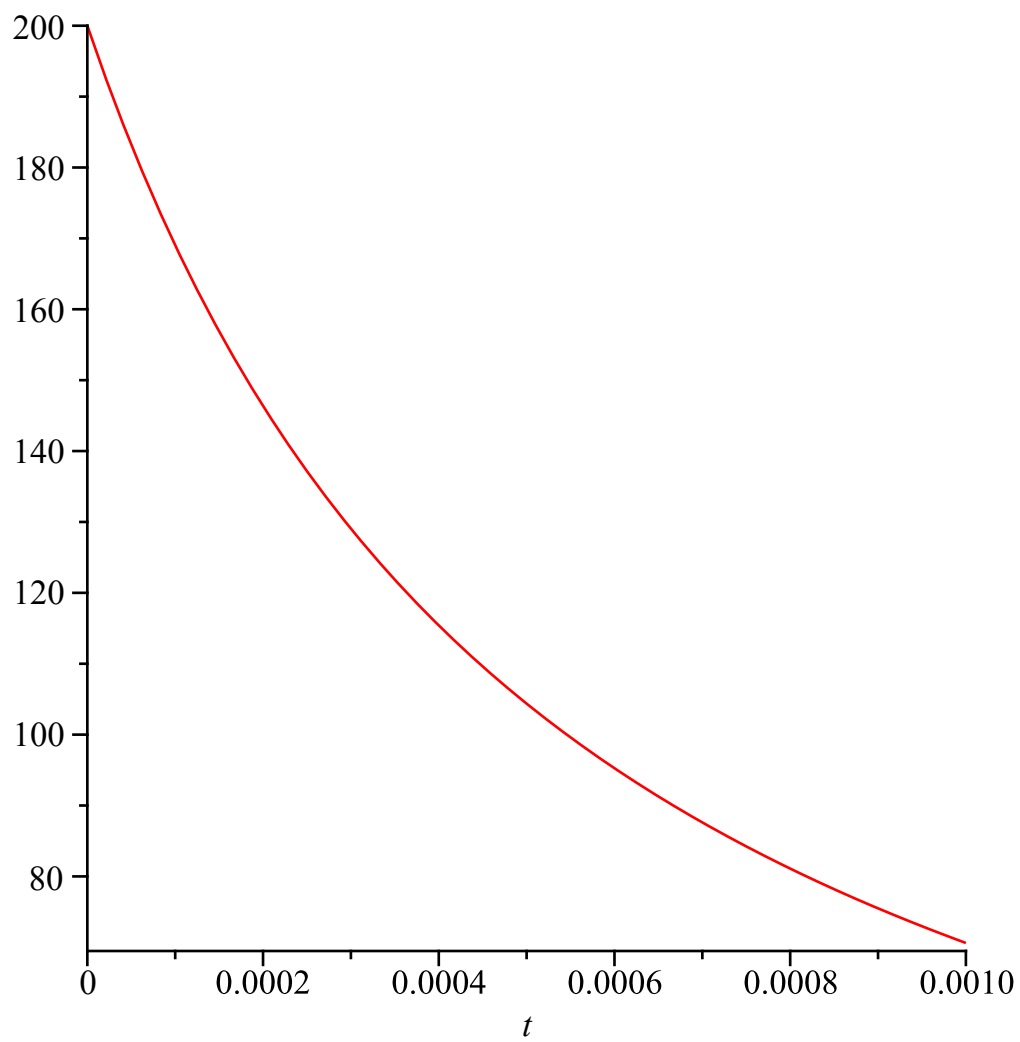
> Solucion₂₀ := simplify(subs(K = rhs(ParametroFinal), Solucion₂))

$$\text{Solucion}_{20} := r(t) = \frac{1}{10} \frac{\ln(1 + 2000 t \ln(5)) - 2000 t \ln(2)}{\ln(5) - \ln(2)} \quad (11)$$

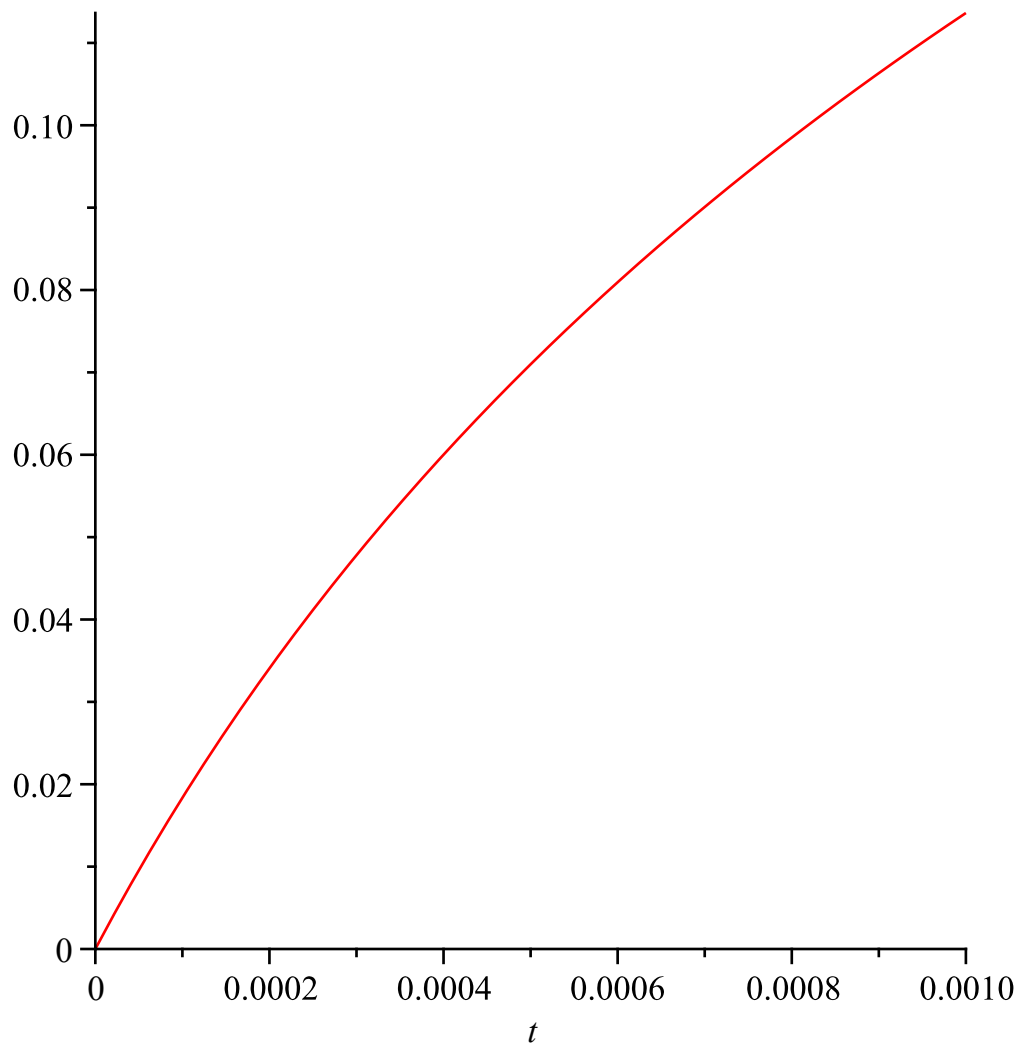
> TiempoRecorrido := subs(K = rhs(ParametroFinal), Parametro) : evalf(%, 4)

$$t_{\text{final}} = 0.0008182 \quad (12)$$

> plot(rhs(Solucion₁₀), t = 0 .. 0.001)



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=  
> plot(rhs(Solucion20), t=0..0.001)
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> TiempoCritico := solve(rhs(Solucion10) = 40, t) : evalf(%, 4)
                                0.002182 (13)
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> GrosorCritico := subs(t = TiempoCritico, rhs(Solucion20)) : evalf(%, 4)
                                0.1756 (14)
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> TiempoCriticoDos := solve(rhs(Solucion10) = 20, t) : evalf(%, 4)
                                0.004910 (15)
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> GrosorCriticoDos := subs(t = TiempoCriticoDos, rhs(Solucion20)) : evalf(%, 4)
                                0.2513 (16)
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