```
> restart
> Ecuacion := diff(v(t), t) = -K·v(t)··2
```

$$Ecuacion := \frac{d}{dt} v(t) = -K\, v(t)^2 \tag{1}$$

```
> with(DEtools) :
> odeadvisor(Ecuacion)
```

$$[\_quadrature] \tag{2}$$

```
> FactInt := intfactor(Ecuacion)
```

$$FactInt := \frac{1}{v(t)^2} \tag{3}$$

```
> EcuacionDos := lhs(Ecuacion)·FactInt = rhs(Ecuacion)·FactInt
```

$$EcuacionDos := \frac{\frac{d}{dt} v(t)}{v(t)^2} = -K \tag{4}$$

```
> SolucionDos := int(1/(v··2), v) = int(rhs(EcuacionDos), t) + C1
```

$$SolucionDos := -\frac{1}{v} = -K\, t + C_1 \tag{5}$$

```
> SolucionDoce := isolate(SolucionDos, v)
```

$$SolucionDoce := v = \frac{1}{K\, t - C_1} \tag{6}$$

```
> SolucionVelocidad := v(t) = rhs(SolucionDoce)
```

$$SolucionVelocidad := v(t) = \frac{1}{K\, t - C_1} \tag{7}$$

```
> Condicion := v(0) = 200
```

$$Condicion := v(0) = 200 \tag{8}$$

```
> Parametro := isolate(subs(t = 0, rhs(SolucionVelocidad) = rhs(Condicion)), C1)
```

$$Parametro := C_1 = -\frac{1}{200} \tag{9}$$

```
> SolucionParticularVelocidad := subs(C1 = rhs(Parametro), SolucionVelocidad)
```

$$SolucionParticularVelocidad := v(t) = \frac{1}{K\, t + \frac{1}{200}} \tag{10}$$

```
> EcuacionTres := diff(x(t), t) = rhs(SolucionParticularVelocidad)
```

$$EcuacionTres := \frac{d}{dt} x(t) = \frac{1}{K\, t + \frac{1}{200}} \tag{11}$$

```
> odeadvisor(EcuacionTres)
```

$$[\_quadrature] \tag{12}$$

```
> intfactor(EcuacionTres)
```

$$1 \tag{13}$$

```
> SolucionTres := int(1, x) = int(rhs(EcuacionTres), t) + C2
```

$$SolucionTres := x = \frac{\ln\left(K\,t + \frac{1}{200}\right)}{K} + C_2 \tag{14}$$

> $ParametroTres := isolate(subs(t = 0, rhs(SolucionTres) = 0), C_2)$

$$ParametroTres := C_2 = -\frac{\ln\left(\frac{1}{200}\right)}{K} \tag{15}$$

> $SolucionTrece := subs(C_2 = rhs(ParametroTres), SolucionTres)$

$$SolucionTrece := x = \frac{\ln\left(K\,t + \frac{1}{200}\right)}{K} + \frac{\ln(200)}{K} \tag{16}$$

> $TiempoFinal := simplify\left(isolate\left(rhs(SolucionTrece) = \frac{1}{10}, t\right)\right)$

$$TiempoFinal := t = \frac{1}{200}\,\frac{e^{\frac{1}{10}K} - 1}{K} \tag{17}$$

> $ParametroK := isolate(subs(t = rhs(TiempoFinal), rhs(SolucionParticularVelocidad) = 80), K); evalf(\%, 5)$

$$ParametroK := K = 10\ln\left(\frac{5}{2}\right)$$

$$K = 9.1629 \tag{18}$$

> $SolucionVelocidadFinal := subs(K = rhs(ParametroK), SolucionParticularVelocidad) : evalf(\%, 3)$

$$v(t) = \frac{1}{9.16\,t + 0.00500} \tag{19}$$

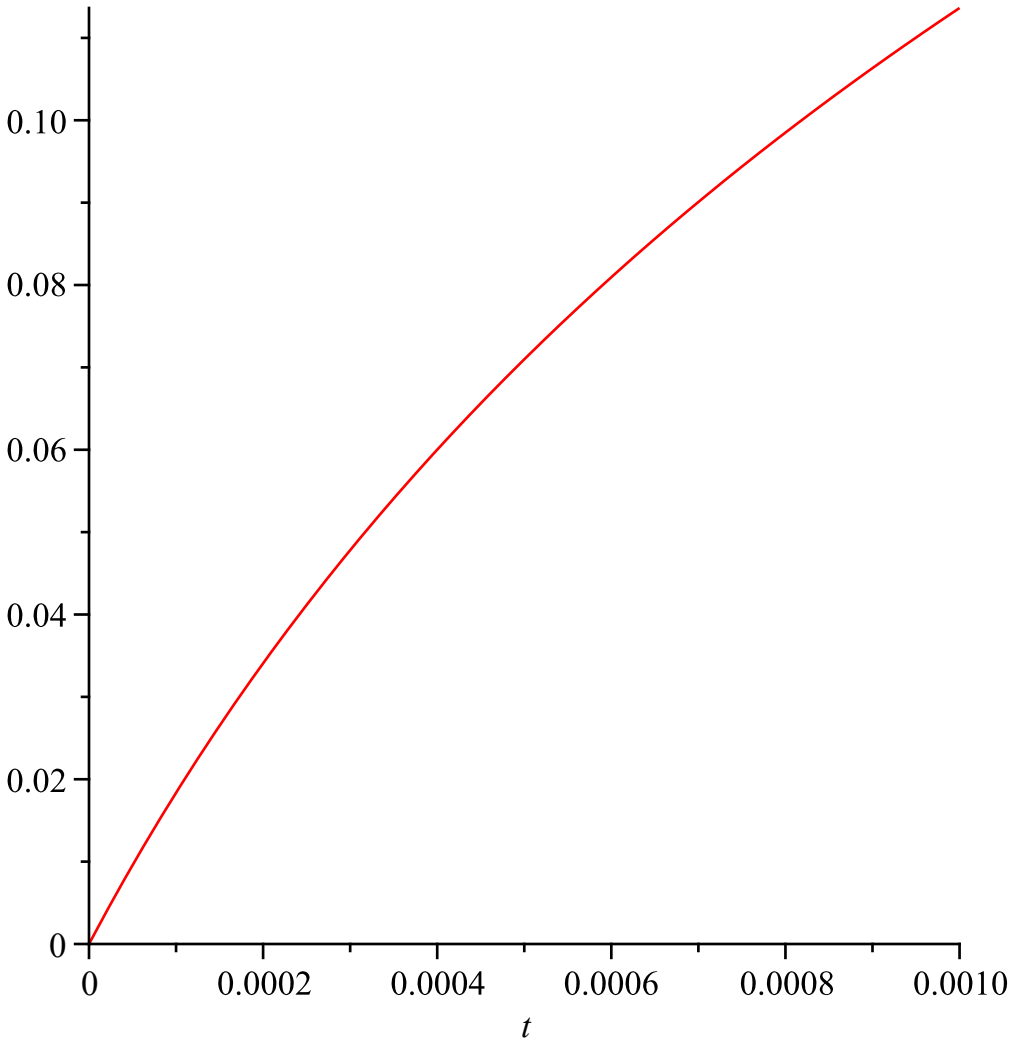
> $SolucionRecorridoFinal := simplify(subs(K = rhs(ParametroK), SolucionTrece)) : evalf(\%, 3)$

$$x = 0.109\ln(1830.\,t + 1.) \tag{20}$$

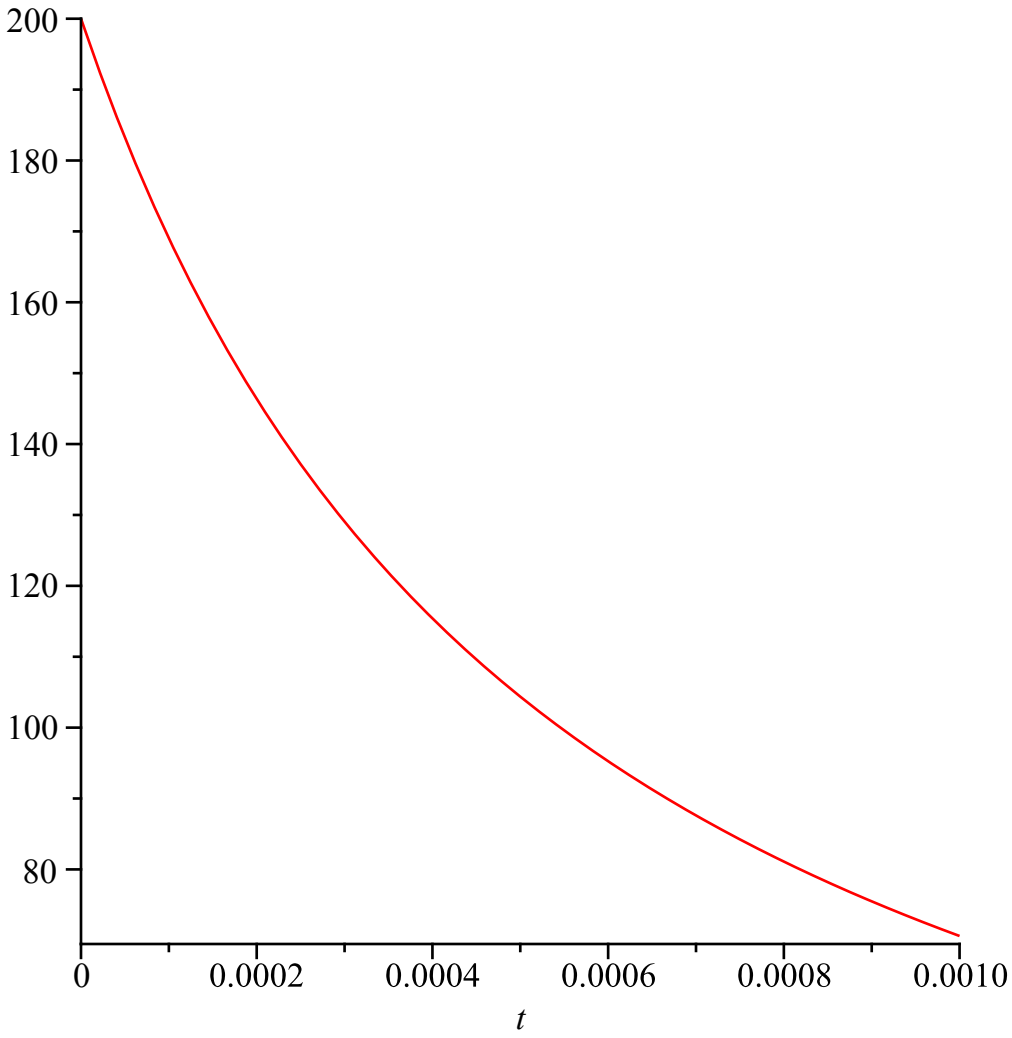
> $TiempoFinalDefinitivo := simplify(subs(K = rhs(ParametroK), rhs(TiempoFinal))) : evalf(\%, 5)$

$$0.00081855 \tag{21}$$

> $plot(rhs(SolucionRecorridoFinal), t = 0..0.001)$




```
> plot(rhs(SolucionVelocidadFinal), t = 0 ..0.001 )
```



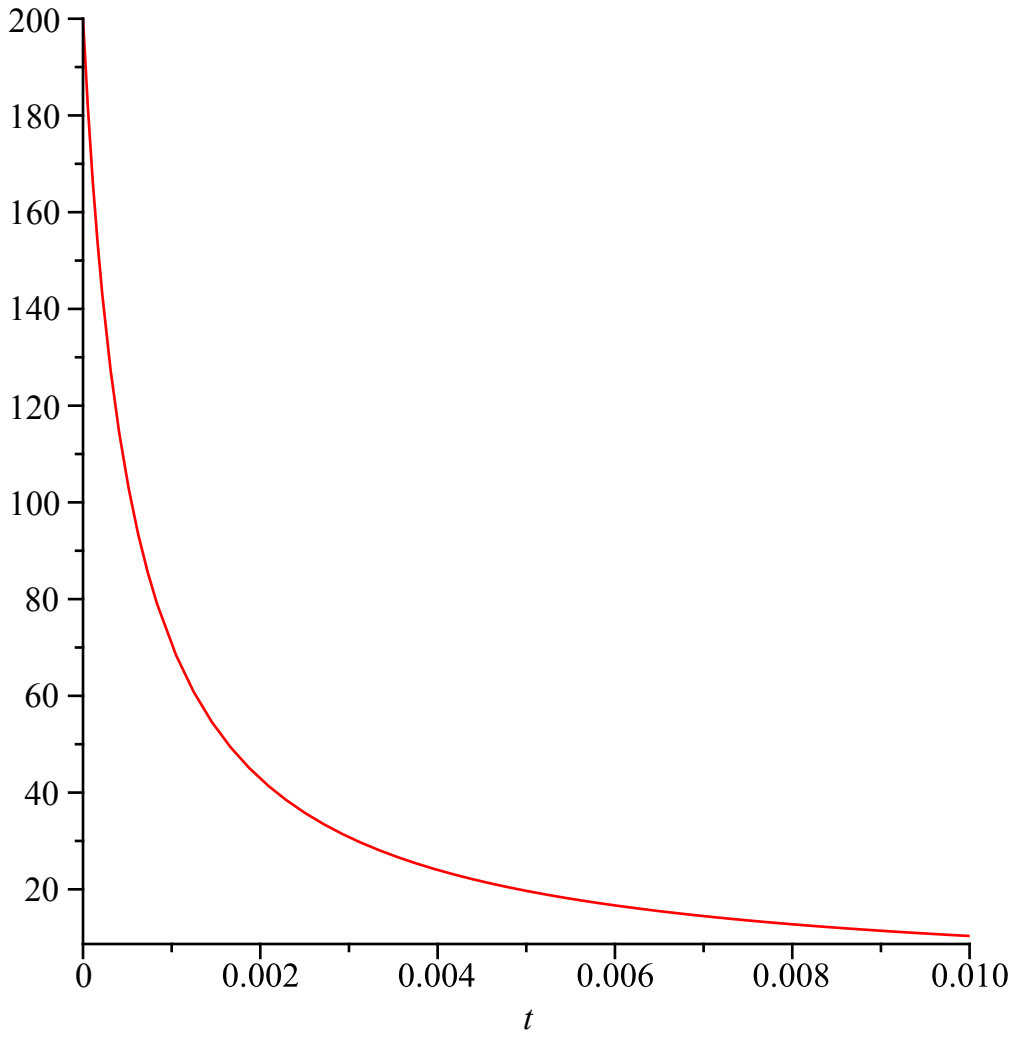
> $NuevoTiempoFinal := isolate(rhs(SolucionVelocidadFinal) = 20, t) : evalf(\%, 5)$

$$t = 0.0049113 \quad \textbf{(22)}$$

> $NuevoRecorrido := subs(t = rhs(NuevoTiempoFinal), rhs(SolucionRecorridoFinal)) : evalf(\%, 5)$

$$0.25131 \quad \textbf{(23)}$$

> $plot(rhs(SolucionVelocidadFinal), t = 0..0.01)$


200
180
160
140
120
100
80
60
40
20
0
0.002
0.004
0.006
0.008
0.010
t