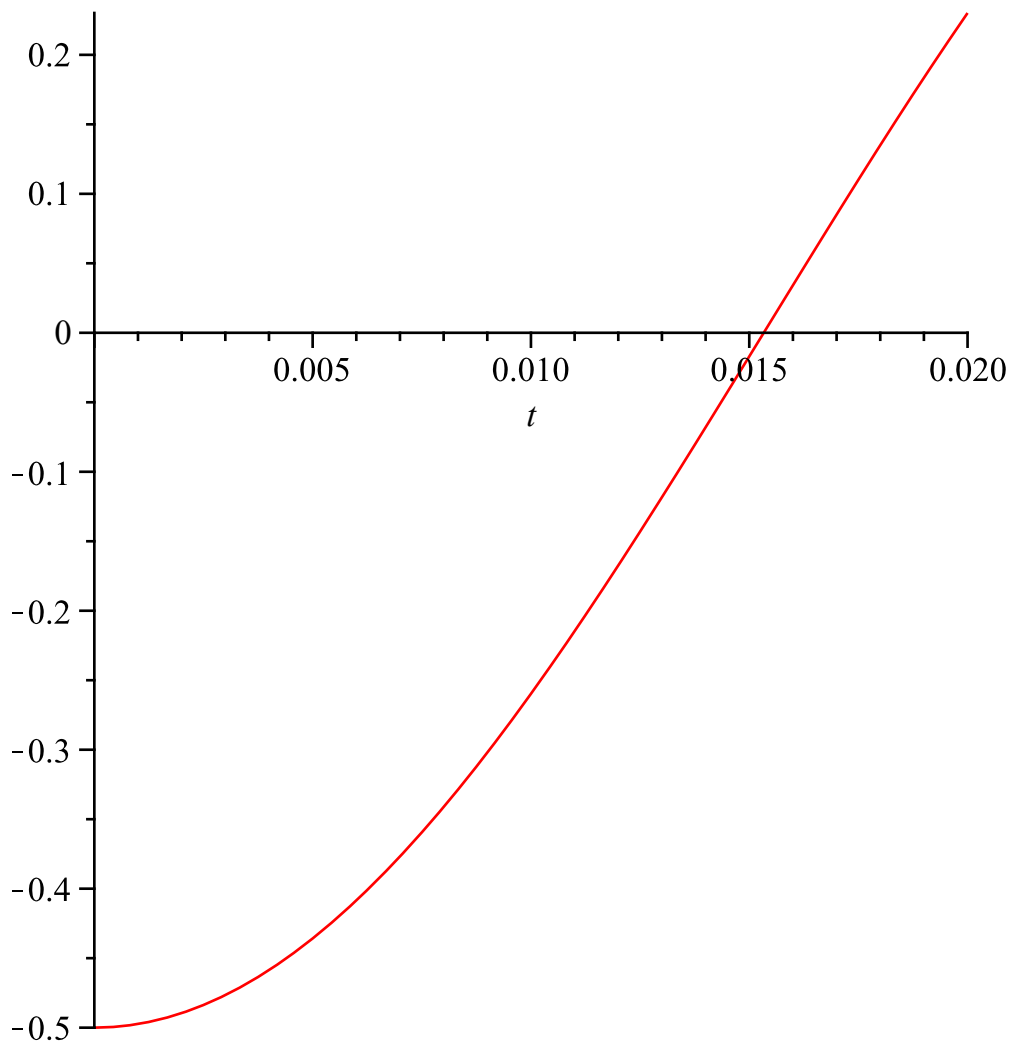


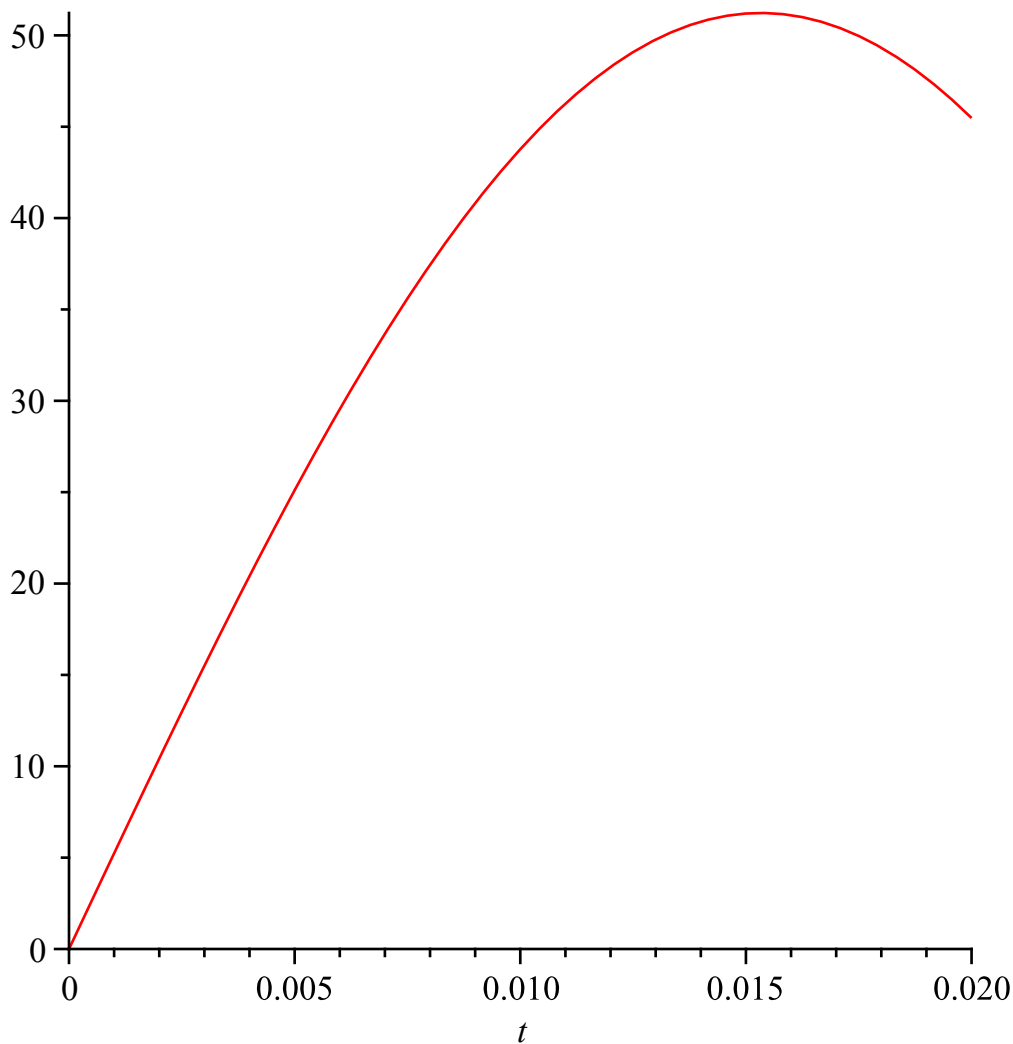
```

[> restart
=
> gravedad :=  $\frac{96171}{10000}$ 
                                 $gravedad := \frac{96171}{10000}$  (1)
=
>  $Peso_8 := \frac{35}{1000}; Hooke := \frac{1146}{30}$ 
                                 $Peso_8 := \frac{7}{200}$ 
                                 $Hooke := \frac{191}{5}$  (2)
=
>  $Ecuacion_8 := \frac{Peso_8}{gravedad} \cdot diff(r(t), t\$2) + Hooke \cdot r(t) = 0$ 
                                 $Ecuacion_8 := \frac{350}{96171} \frac{d^2}{dt^2} r(t) + \frac{191}{5} r(t) = 0$  (3)
=
>  $Condicion_8 := r(0) = -\left(\frac{73}{100} - \frac{23}{100}\right), D(r)(0) = 0$ 
                                 $Condicion_8 := r(0) = -\frac{1}{2}, D(r)(0) = 0$  (4)
=
>  $Solucion_8 := dsolve(\{Ecuacion_8, Condicion_8\})$ 
                                 $Solucion_8 := r(t) = -\frac{1}{2} \cos\left(\frac{1}{350} \sqrt{1285806270} t\right)$  (5)
=
>  $plot(rhs(Solucion_8), t=0..0.02)$ 

```



=
> `plot(rhs(diff(Solucion8, t)), t=0..0.02)`



> $tiempo_{empuje} := solve(rhs(Solucion_8) = 0, t); evalf(\%, 3)$

$$tiempo_{empuje} := \frac{5}{36737322} \pi \sqrt{1285806270}$$

0.0154

(6)

> $Velocidad_{inicial} := subs(t = tiempo_{empuje}, rhs(diff(Solucion_8, t))); evalf(\%, 3); evalf(\% \%, 3)$
 ·3.6

$$Velocidad_{inicial} := \frac{1}{700} \sin\left(\frac{1}{2} \pi\right) \sqrt{1285806270}$$

51.3
184.68

(7)

> $EcuacionY := diff(y(t), t\$2) = -gravedad; EcuacionX := diff(x(t), t) = Velocidad_{inicial}$
 · $\cos\left(\frac{\text{Pi}}{4}\right)$

$$EcuacionY := \frac{d^2}{dt^2} y(t) = -\frac{96171}{10000}$$

$$EcuacionX := \frac{d}{dt} x(t) = \frac{1}{1400} \sqrt{1285806270} \sqrt{2}$$

(8)

> $CondicionY := y(0) = 2, D(y)(0) = Velocidad_{inicial} \cdot \sin\left(\frac{\pi}{4}\right); CondicionX := x(0) = 5$

$$CondicionY := y(0) = 2, D(y)(0) = \frac{1}{1400} \sqrt{1285806270} \sqrt{2}$$

$$CondicionX := x(0) = 5$$

(9)

> $SolucionY := dsolve(\{EcuacionY, CondicionY\}); SolucionX := dsolve(\{EcuacionX, CondicionX\})$

$$SolucionY := y(t) = -\frac{96171}{20000} t^2 + \frac{1}{1400} \sqrt{1285806270} \sqrt{2} t + 2$$

$$SolucionX := x(t) = \frac{1}{700} \sqrt{642903135} t + 5$$

(10)

> $TiempoVuelo := solve(rhs(SolucionY) = 0, t); evalf(%, 3)$

$$TiempoVuelo := \frac{100}{673197} \sqrt{642903135} - \frac{100}{673197} \sqrt{661752651}, \frac{100}{673197} \sqrt{642903135} + \frac{100}{673197} \sqrt{661752651}$$

$$-0.05, 7.61$$

(11)

> $DistanciaMaxima := subs(t = TiempoVuelo_2, rhs(SolucionX)); evalf(%, 4)$

$$DistanciaMaxima := \frac{1}{700} \sqrt{642903135} \left(\frac{100}{673197} \sqrt{642903135} + \frac{100}{673197} \sqrt{661752651} \right) + 5$$

$$279.9$$

(12)

> $TiempoAlturaMaxima := solve(rhs(diff(SolucionY, t)) = 0, t); evalf(%, 3)$

$$TiempoAlturaMaxima := \frac{50}{673197} \sqrt{1285806270} \sqrt{2}$$

$$3.76$$

(13)

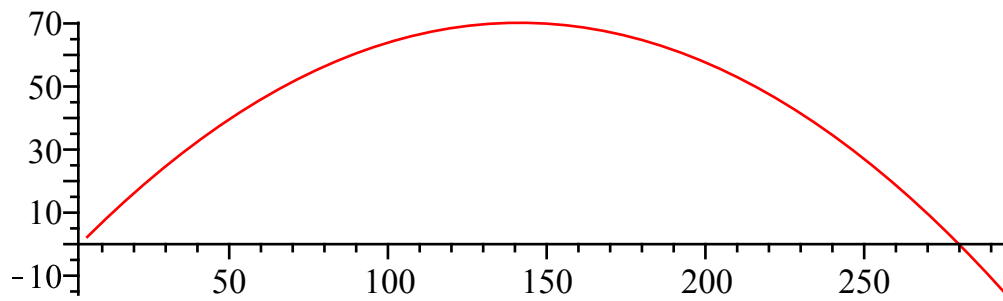
> $AlturaMaxima := subs(t = TiempoAlturaMaxima, rhs(SolucionY)); evalf(%, 3)$

$$AlturaMaxima := \frac{983}{14}$$

$$70.2$$

(14)

> $plot([rhs(SolucionX), rhs(SolucionY), t = 0 .. 8], scaling = CONSTRAINED)$



>

solucion 7

> restart

> $gravedad := \frac{96171}{10000}$

$$gravedad := \frac{96171}{10000}$$

(15)

> $Peso_7 := \frac{30}{1000}; Hooke := \frac{1146}{30}$

$$Peso_7 := \frac{3}{100}$$

$$Hooke := \frac{191}{5}$$

(16)

> $Ecuacion_7 := \frac{Peso_7}{gravedad} \cdot diff(r(t), t\$2) + Hooke \cdot r(t) = 0$

$$Ecuacion_7 := \frac{100}{32057} \frac{d^2}{dt^2} r(t) + \frac{191}{5} r(t) = 0$$

(17)

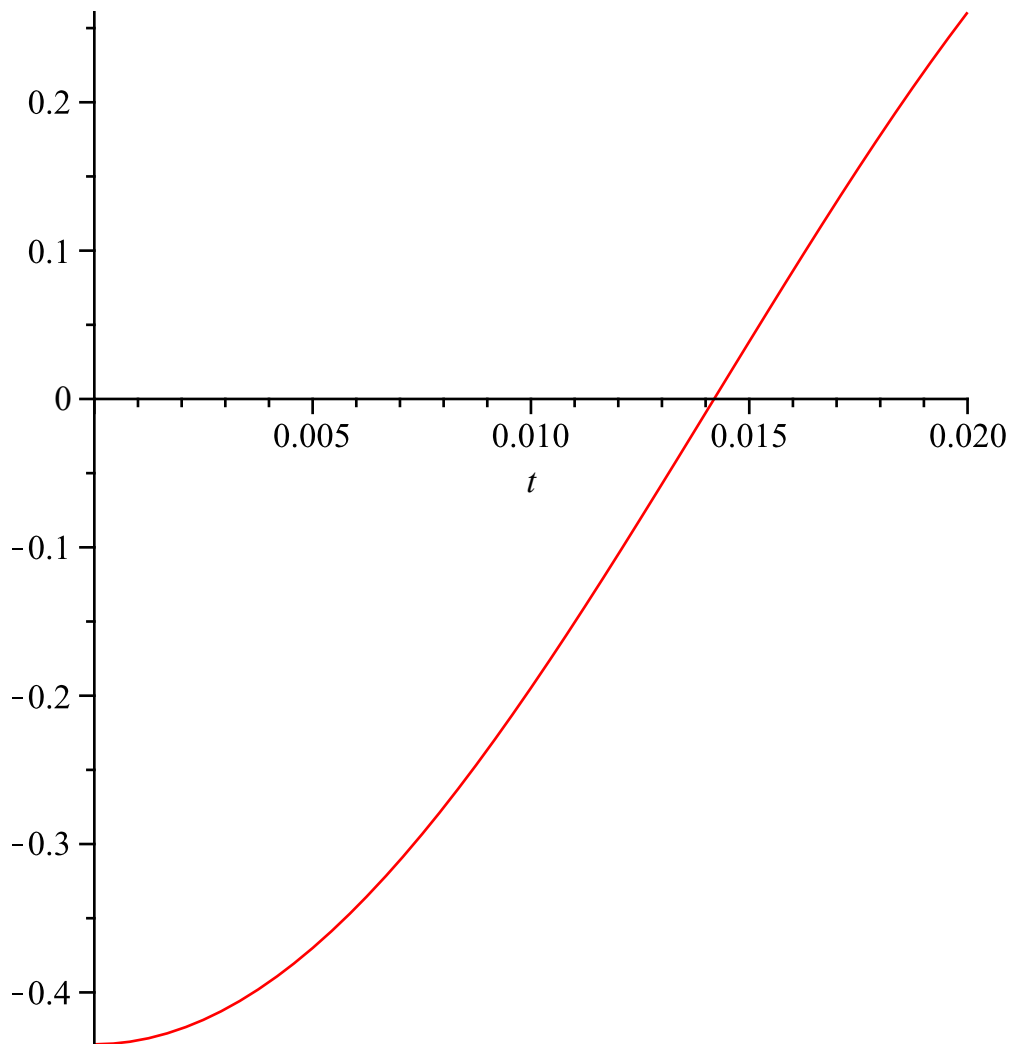
> $Condicion_7 := r(0) = -\left(\frac{665}{1000} - \frac{23}{100}\right), D(r)(0) = 0$

$$Condicion_7 := r(0) = -\frac{87}{200}, D(r)(0) = 0 \quad (18)$$

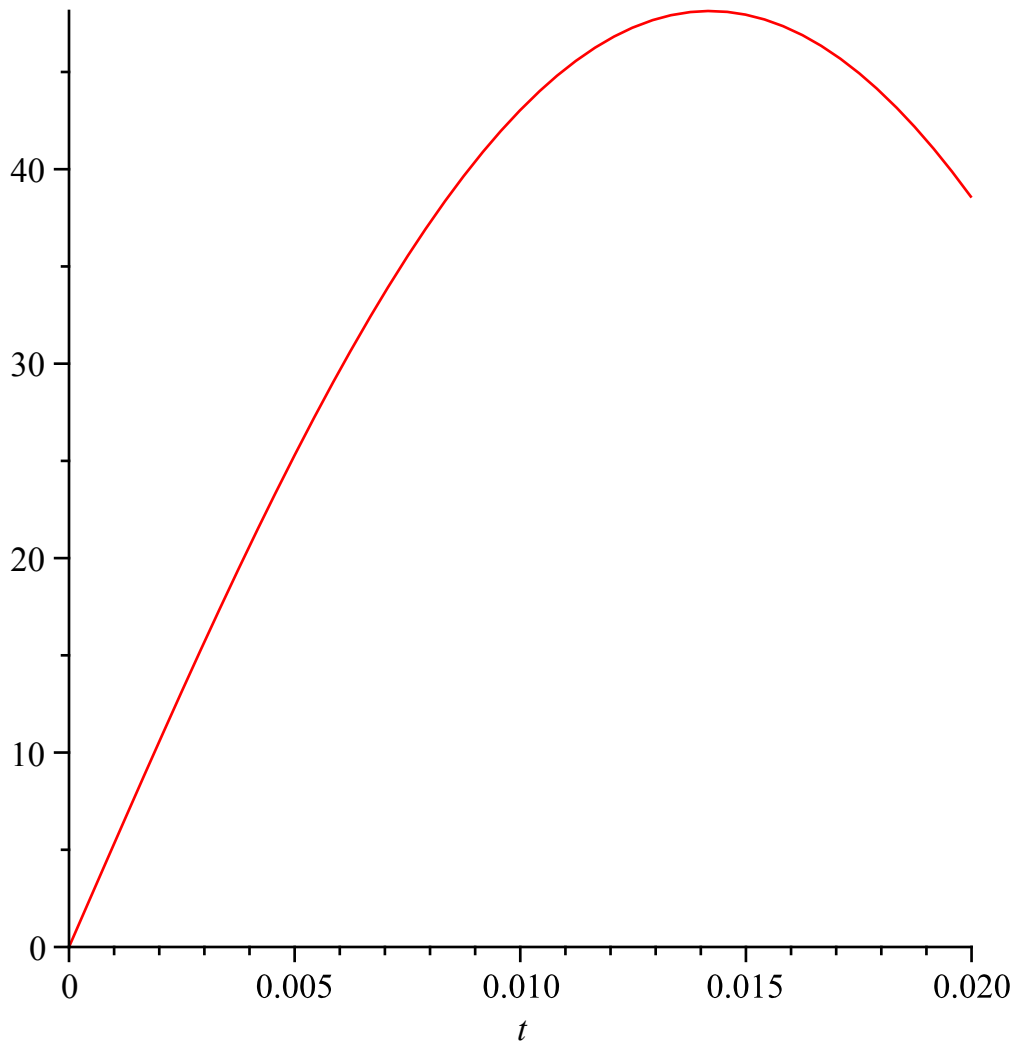
> $Solucion_7 := dsolve(\{Ecuacion_7, Condicion_7\})$

$$Solucion_7 := r(t) = -\frac{87}{200} \cos\left(\frac{1}{50} \sqrt{30614435} t\right) \quad (19)$$

> $plot(rhs(Solucion_7), t=0..0.02)$



> $plot(rhs(diff(Solucion_7, t)), t=0..0.02)$



> $tiempo_{empuje} := solve(rhs(Solucion_7) = 0, t); evalf(\%, 3)$

$$tiempo_{empuje} := \frac{5}{6122887} \pi \sqrt{30614435}$$

$$0.0142$$

(20)

> $Velocidad_{inicial} := subs(t = tiempo_{empuje}, rhs(diff(Solucion_7, t))); evalf(\%, 3); evalf(\% \%, 3)$
 ·3.6

$$Velocidad_{inicial} := \frac{87}{10000} \sin\left(\frac{1}{2} \pi\right) \sqrt{30614435}$$

$$48.1$$

$$173.16$$

(21)

> $EcuacionY := diff(y(t), t\$2) = -gravedad; EcuacionX := diff(x(t), t) = Velocidad_{inicial}$
 · $\cos\left(\frac{\text{Pi}}{4}\right)$

$$EcuacionY := \frac{d^2}{dt^2} y(t) = -\frac{96171}{10000}$$

$$EcuacionX := \frac{d}{dt} x(t) = \frac{87}{20000} \sqrt{30614435} \sqrt{2}$$

(22)

> $CondicionY := y(0) = 2, D(y)(0) = Velocidad_{inicial} \cdot \sin\left(\frac{\pi}{4}\right); CondicionX := x(0) = 5$

$$CondicionY := y(0) = 2, D(y)(0) = \frac{87}{20000} \sqrt{30614435} \sqrt{2}$$

$$CondicionX := x(0) = 5$$

(23)

> $SolucionY := dsolve(\{EcuacionY, CondicionY\}); SolucionX := dsolve(\{EcuacionX, CondicionX\})$

$$SolucionY := y(t) = -\frac{96171}{20000} t^2 + \frac{87}{20000} \sqrt{30614435} \sqrt{2} t + 2$$

$$SolucionX := x(t) = \frac{87}{20000} \sqrt{61228870} t + 5$$

(24)

> $TiempoVuelo := solve(rhs(SolucionY) = 0, t); evalf(%, 3)$

$$TiempoVuelo := \frac{29}{64114} \sqrt{30614435} \sqrt{2} - \frac{1}{192342} \sqrt{478828677030},$$

$$\frac{29}{64114} \sqrt{30614435} \sqrt{2} + \frac{1}{192342} \sqrt{478828677030}$$

$$-0.07, 7.13$$

(25)

> $DistanciaMaxima := subs(t = TiempoVuelo_2, rhs(SolucionX)); evalf(%, 4)$

$$DistanciaMaxima := \frac{87}{20000} \sqrt{61228870} \left(\frac{29}{64114} \sqrt{30614435} \sqrt{2} \right.$$

$$\left. + \frac{1}{192342} \sqrt{478828677030} \right) + 5$$

$$247.9$$

(26)

> $TiempoAlturaMaxima := solve(rhs(diff(SolucionY, t)) = 0, t); evalf(%, 3)$

$$TiempoAlturaMaxima := \frac{29}{64114} \sqrt{30614435} \sqrt{2}$$

$$3.53$$

(27)

> $AlturaMaxima := subs(t = TiempoAlturaMaxima, rhs(SolucionY)); evalf(%, 3)$

$$AlturaMaxima := \frac{497893}{8000}$$

$$62.2$$

(28)

> $plot([rhs(SolucionX), rhs(SolucionY), t = 0..8], scaling = CONSTRAINED)$

