> *restart*

>

PROBLEMA DEL ARCO Y LA FLECHA

> $EcuaDinamica := -Hooke \cdot s(t) = Masa \cdot diff(s(t), t\$2)$

$$EcuaDinamica := -Hooke\, s(t) = Masa \left(\frac{d^2}{dt^2}\, s(t)\right) \tag{1}$$

> $Condicion := s(0) = -\frac{392}{1000}, D(s)(0) = 0$

$$Condicion := s(0) = -\frac{49}{125}, D(s)(0) = 0 \tag{2}$$

> $Hooke := \frac{\left(\frac{1348}{100}\right)}{\frac{35}{100}}; Masa := \frac{\left(\frac{16}{1000}\right)}{\frac{981}{100}};$

$$Hooke := \frac{1348}{35}$$

$$Masa := \frac{8}{4905} \tag{3}$$

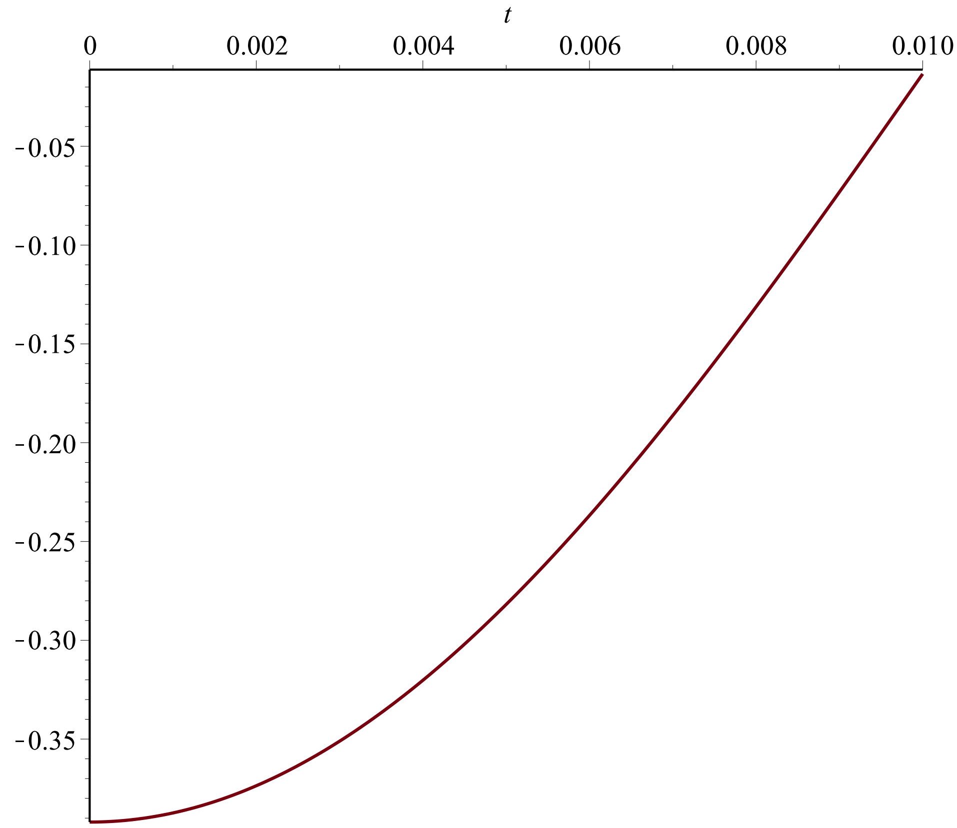
> *EcuaDinamica*

$$-\frac{1348}{35}\, s(t) = \frac{8}{4905}\, \frac{d^2}{dt^2}\, s(t) \tag{4}$$

> $Solucion := dsolve(\{EcuaDinamica, Condicion\})$

$$Solucion := s(t) = -\frac{49}{125} \cos\left(\frac{3}{14}\sqrt{514262}\; t\right) \tag{5}$$

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



> $TiempoEmpuje := solve(rhs(Solucion) = 0) : evalf(\%);$

$$0.01022196621 \tag{6}$$

> $Velocidad := subs(t = TiempoEmpuje, rhs(diff(Solucion, t))); evalf(\%); evalf(\%\%) \cdot 3.6$

$$Velocidad := \frac{21}{250} \sin\left(\frac{1}{2}\pi\right)\sqrt{514262}$$

$$60.23813304$$

$$216.8572789 \tag{7}$$

> $EcuaVertical := diff(y(t), t\$2) = -\frac{981}{100}$

$$EcuaVertical := \frac{d^2}{dt^2} y(t) = -\frac{981}{100} \tag{8}$$

> $EcuaHoriz := diff(x(t), t) = Velocidad \cdot \cos\left(\frac{Pi}{4}\right)$

$$EcuaHoriz := \frac{d}{dt} x(t) = \frac{21}{500}\sqrt{514262}\sqrt{2} \tag{9}$$

> $CondVertical := y(0) = 2, D(y)(0) = Velocidad \cdot \sin\left(\frac{Pi}{4}\right)$

$$CondVertical := y(0) = 2, D(y)(0) = \frac{21}{500}\sqrt{514262}\sqrt{2} \quad \textbf{(10)}$$

> $CondHoriz := x(0) = 5$

$$CondHoriz := x(0) = 5 \quad \textbf{(11)}$$

> $SolVert := dsolve(\{EcuaVertical, CondVertical\})$

$$SolVert := y(t) = -\frac{981}{200}t^2 + \frac{21}{500}\sqrt{514262}\sqrt{2}\,t + 2 \quad \textbf{(12)}$$

> $SolHoriz := dsolve(\{EcuaHoriz, CondHoriz\})$

$$SolHoriz := x(t) = \frac{21}{250}\sqrt{257131}\,t + 5 \quad \textbf{(13)}$$

> $TiempoVuelo := solve(rhs(SolVert) = 0); evalf(\%)$

$$TiempoVuelo := \frac{14}{1635}\sqrt{257131} - \frac{2}{1635}\sqrt{12871919}, \frac{14}{1635}\sqrt{257131} + \frac{2}{1635}\sqrt{12871919}$$

$$-0.046702924, 8.730656514 \quad \textbf{(14)}$$

> $DistanciaFinal := subs(t = TiempoVuelo[2], rhs(SolHoriz)); evalf(\%)$

$$DistanciaFinal := \frac{21}{250}\sqrt{257131}\left(\frac{14}{1635}\sqrt{257131} + \frac{2}{1635}\sqrt{12871919}\right) + 5$$

$$376.8805014 \quad \textbf{(15)}$$

> $TiempoAlturaMax := solve(rhs(diff(SolVert, t)) = 0); evalf(\%)$

$$TiempoAlturaMax := \frac{7}{1635}\sqrt{514262}\sqrt{2}$$

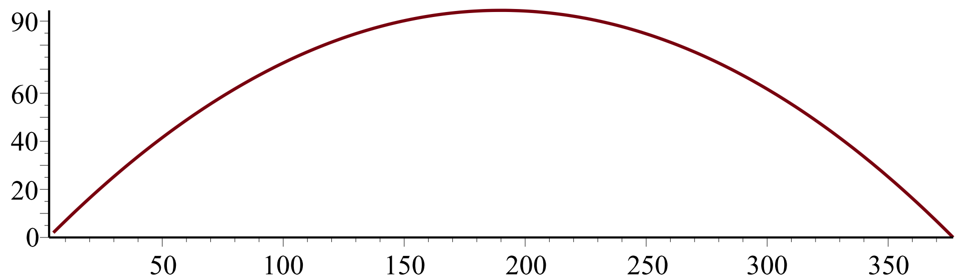
$$4.341976796 \quad \textbf{(16)}$$

> $AlturaMax := subs(t = TiempoAlturaMax, rhs(SolVert)); evalf(\%)$

$$AlturaMax := \frac{118091}{1250}$$

$$94.47280000 \quad \textbf{(17)}$$

> $plot([rhs(SolHoriz), rhs(SolVert), t = 0..TiempoVuelo[2]], scaling = CONSTRAINED)$



90
60
40
20
0
50
100
150
200
250
300
350

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