

$$\begin{aligned} &> \text{restart} \\ &> \text{Ecuacion} := \text{diff}(y(x), x) = 0 \\ &\text{Ecuacion} := \frac{d}{dx} y(x) = 0 \end{aligned} \quad (1)$$

$$\begin{aligned} &> \text{Solucion} := \text{dsolve}(\text{Ecuacion}) \\ &\text{Solucion} := y(x) = c_1 \end{aligned} \quad (2)$$

> restart

Problema del arco recurvo y la flecha de alumnio morada
Fase dinámica

$$\begin{aligned} &> \text{gravedad} := \frac{981}{100}; \text{Hooke} := \frac{14}{\left(\frac{4}{10}\right)}; \text{Peso} := \frac{21}{1000} \\ &\text{gravedad} := \frac{981}{100} \\ &\text{Hooke} := 35 \\ &\text{Peso} := \frac{21}{1000} \end{aligned} \quad (3)$$

$$\begin{aligned} &> \text{Ecuacion} := \text{diff}(s(t), t\$2) \cdot \left(\frac{\text{Peso}}{\text{gravedad}}\right) = -\text{Hooke} \cdot s(t) \\ &\text{Ecuacion} := \frac{7 \frac{d^2}{dt^2} s(t)}{3270} = -35 s(t) \end{aligned} \quad (4)$$

$$\begin{aligned} &> \text{CondIni} := s(0) = -\frac{44}{100}, D(s)(0) = 0 \\ &\text{CondIni} := s(0) = -\frac{11}{25}, D(s)(0) = 0 \end{aligned} \quad (5)$$

$$\begin{aligned} &> \text{SolucionParticular} := \text{dsolve}(\{\text{Ecuacion}, \text{CondIni}\}); \text{evalf}(\%, 4) \\ &\text{SolucionParticular} := s(t) = -\frac{11 \cos(5 \sqrt{654} t)}{25} \\ &s(t) = -0.4400 \cos(127.8 t) \end{aligned} \quad (6)$$

$$\begin{aligned} &> \text{tiempo} := \text{solve}(\text{rhs}(\text{SolucionParticular}) = 0, t); \text{evalf}(\%, 3) \\ &\text{tiempo} := \frac{\pi \sqrt{654}}{6540} \\ &0.0123 \end{aligned} \quad (7)$$

$$\begin{aligned} &> \text{Velocidad} := \text{subs}(t = \text{tiempo}, \text{rhs}(\text{diff}(\text{SolucionParticular}, t))); \text{evalf}(\%, 3) \\ &\text{Velocidad} := \frac{11 \sqrt{654} \sin\left(\frac{\pi}{2}\right)}{5} \\ &56.3 \end{aligned} \quad (8)$$

>

Problema cinemático

> Velocidad

$$\frac{11\sqrt{654}}{5} \quad (9)$$

> EcuacionVertical := diff(y(t), t\$2) = -gravedad

$$EcuacionVertical := \frac{d^2}{dt^2} y(t) = -\frac{981}{100} \quad (10)$$

> EcuacionHorizontal := diff(x(t), t) = Velocidad · cos\left(\frac{\text{Pi}}{4}\right)

$$EcuacionHorizontal := \frac{d}{dt} x(t) = \frac{11\sqrt{654}\sqrt{2}}{10} \quad (11)$$

> evalf(Pi, 100)

$$3.14159265358979323846264338327950288419716939937510582097494459230781640628620\backslash \quad (12)$$

$$8998628034825342117068$$

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

$$CondVertical := y(0) = 2, D(y)(0) = \frac{11\sqrt{654}\sqrt{2}}{10} \quad (13)$$

> CondHorizontal := x(0) = 0

$$CondHorizontal := x(0) = 0 \quad (14)$$

> SolucionVertical := dsolve({EcuacionVertical, CondVertical}); evalf(%, 3)

$$SolucionVertical := y(t) = -\frac{981}{200} t^2 + \frac{11\sqrt{327}}{5} t + 2$$

$$y(t) = -4.90 t^2 + 39.8 t + 2. \quad (15)$$

> SolucionHorizontal := dsolve({EcuacionHorizontal, CondHorizontal}); evalf(%, 3)

$$SolucionHorizontal := x(t) = \frac{11\sqrt{327}}{5} t$$

$$x(t) = 39.8 t \quad (16)$$

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

$$TiempoVuelo := \frac{220\sqrt{327}}{981} - \frac{40\sqrt{10137}}{981}, \frac{220\sqrt{327}}{981} + \frac{40\sqrt{10137}}{981}$$

$$-0.03, 8.13 \quad (17)$$

> DistanciaMax := subs(t = TiempoVuelo[2], rhs(SolucionHorizontal)); evalf(%, 3)

$$DistanciaMax := \frac{11\sqrt{327}}{5} \left(\frac{220\sqrt{327}}{981} + \frac{40\sqrt{10137}}{981} \right)$$

$$323. \quad (18)$$

> TiempoAltura := solve(rhs(diff(SolucionVertical, t)) = 0, t); evalf(%, 3)

$$TiempoAltura := \frac{220 \sqrt{327}}{981}$$

4.05

(19)

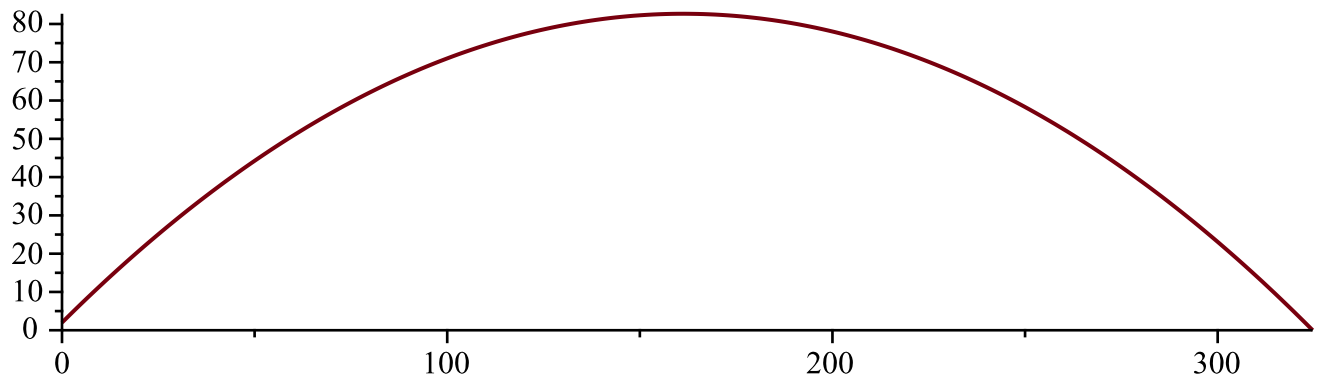
```
> AlturaMax := subs(t = TiempoAltura, rhs(SolucionVertical)); evalf(%, 3)
```

$$AlturaMax := \frac{248}{3}$$

82.7

(20)

```
> plot([rhs(SolucionHorizontal), rhs(SolucionVertical), t = 0 .. TiempoVuelo[2]], scaling
= CONSTRAINED)
```



```
> ?plot
```

```
>
```