```
> restart
>
```

PROBLEMA DEL ARCO Y LA FLECHA

```
> restart
> Hooke := (11)/(30/100); MasaFlecha := (16/1000)/(981/100)
```

$$Hooke := \frac{110}{3}$$

$$MasaFlecha := \frac{8}{4905} \tag{1}$$

```
> Ecua := -Hooke·s(t) = MasaFlecha·diff(s(t), t$2); evalf(%, 3)
```

$$Ecua := -\frac{110\, s(t)}{3} = \frac{8\, \frac{d^2}{dt^2} s(t)}{4905}$$

$$-36.7\, s(t) = 0.00163\, \frac{d^2}{dt^2} s(t) \tag{2}$$

```
> EcuaDos := (rhs(Ecua) - lhs(Ecua))/(8/4905) = 0; evalf(%, 3)
```

$$EcuaDos := \frac{d^2}{dt^2} s(t) + \frac{89925\, s(t)}{4} = 0$$

$$\frac{d^2}{dt^2} s(t) + 22500.\, s(t) = 0. \tag{3}$$

```
> CondIni := s(0) = -36/100, D(s)(0) = 0
```

$$CondIni := s(0) = -\frac{9}{25}, D(s)(0) = 0 \tag{4}$$

```
> SolGral := dsolve(EcuaDos); evalf(%, 3)
```

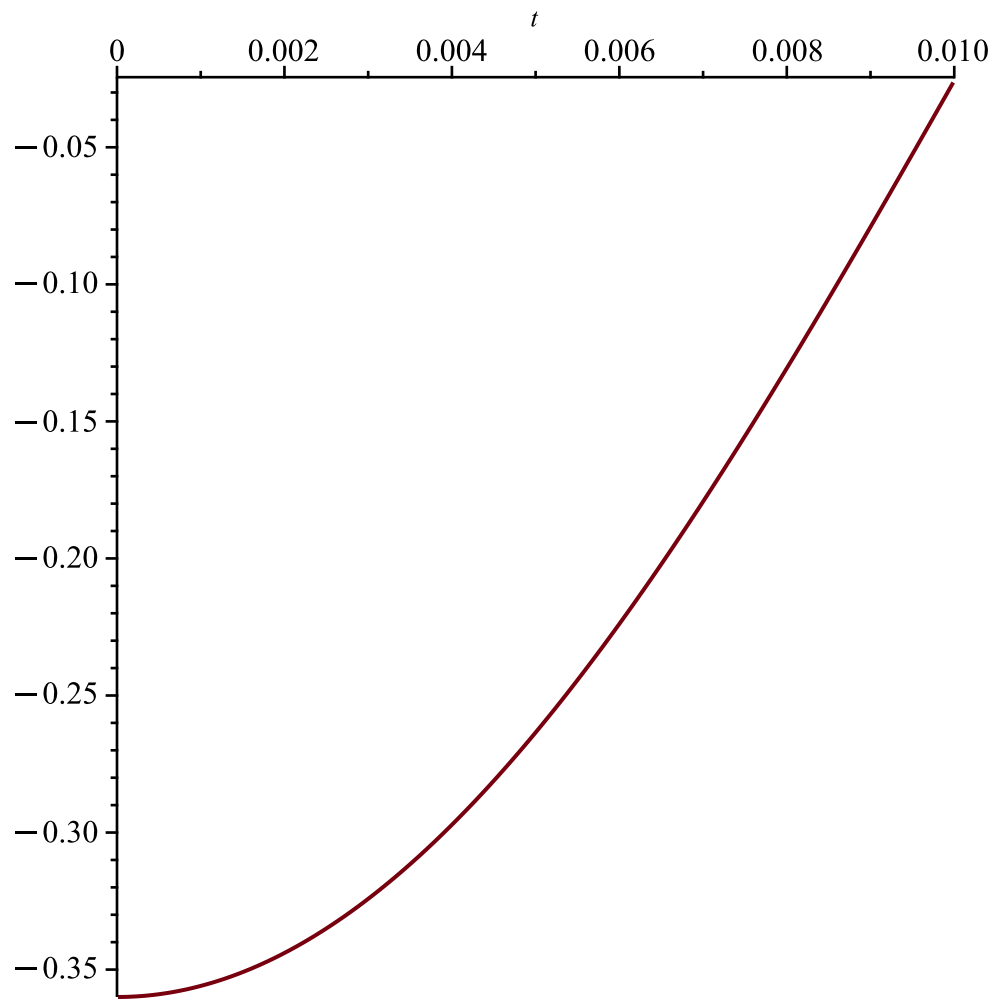
$$SolGral := s(t) = c_1 \sin\left(\frac{5\sqrt{3597}\, t}{2}\right) + c_2 \cos\left(\frac{5\sqrt{3597}\, t}{2}\right)$$

$$s(t) = c_1 \sin(150.\, t) + c_2 \cos(150.\, t) \tag{5}$$

```
> SolPart := dsolve({EcuaDos, CondIni}) : evalf(%, 3)
```

$$s(t) = -0.360 \cos(150.\, t) \tag{6}$$

```
> plot(rhs(SolPart), t = 0..0.01)
```



> $Tiempo := solve(rhs(SolPart) = 0) : evalf(\%, 6)$

$$0.0104763 \quad \textbf{(7)}$$

> $Velocidad := subs(t = Tiempo, rhs(diff(SolPart, t))); evalf(\%, 3); \frac{evalf(\%, 3) \cdot 3600}{1000}$

$$Velocidad := \frac{9\sqrt{3597}\,\sin\left(\frac{\pi}{2}\right)}{10}$$

$$54.0$$

$$194.4000000 \quad \textbf{(8)}$$

VUELO LIBRE FLECHA

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

$$EcuaVertical := \frac{d^2}{dt^2}\,y(t) = -\frac{981}{100} \quad \textbf{(9)}$$

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

$$EcuaHorizontal := \frac{d}{dt}\,x(t) = \frac{9\sqrt{3597}\,\sqrt{2}}{20} \quad \textbf{(10)}$$

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

$$CondVertical := y(0) = 2, \mathrm{D}(y)(0) = \frac{9\sqrt{3597}\sqrt{2}}{20} \quad (11)$$

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

$$CondHoriz := x(0) = 5 \quad (12)$$

> $SolVertical := dsolve(\{EcuaVertical, CondVertical\}) : evalf(\%, 3)$

$$y(t) = -4.90\, t^2 + 38.2\, t + 2. \quad (13)$$

> $SolHorizontal := dsolve(\{EcuaHorizontal, CondHoriz\}) : evalf(\%, 3)$

$$x(t) = 38.2\, t + 5. \quad (14)$$

> $TiempoVuelo := solve(rhs(SolVertical) = 0); evalf(\%, 3)$

$$TiempoVuelo := \frac{5\sqrt{7194}}{109} - \frac{5\sqrt{66490}}{327}, \frac{5\sqrt{7194}}{109} + \frac{5\sqrt{66490}}{327}$$

$$-0.06, 7.84 \quad (15)$$

> $DistanciaFinal := subs(t = TiempoVuelo[2], rhs(SolHorizontal)); evalf(\%, 3)$

$$DistanciaFinal := \frac{9\sqrt{7194}\left(\frac{5\sqrt{7194}}{109} + \frac{5\sqrt{66490}}{327}\right)}{20} + 5$$

$$304. \quad (16)$$

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

$$TiempoAlturaMaxima := \frac{5\sqrt{7194}}{109}$$

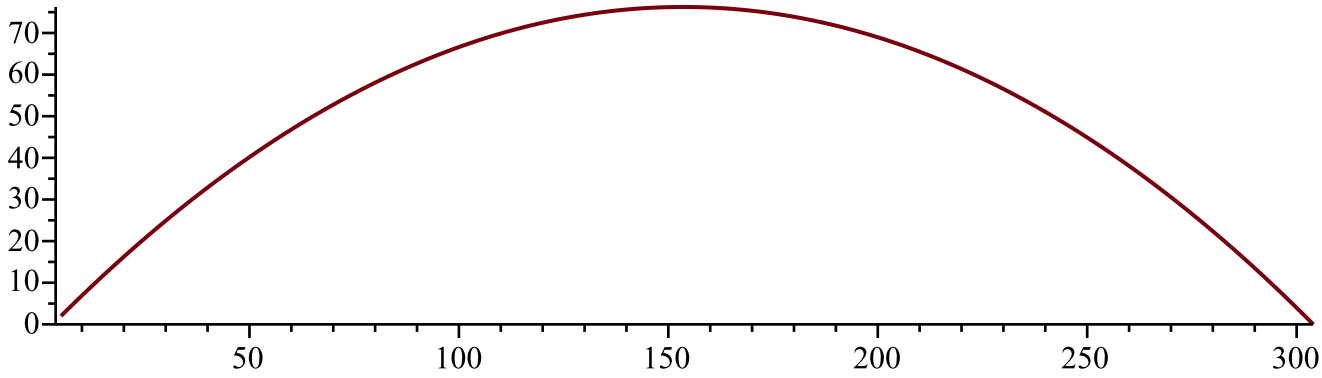
$$3.89 \quad (17)$$

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

$$AlturaMaxima := \frac{305}{4}$$

$$76.2 \quad (18)$$

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


70
60
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10
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200
250
300

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