```
> restart
```

TIRO CON ARCO Y FLECHA

```
> EcuacionDinamica := -Hooke·s(t) = Masa·diff(s(t), t$2)
```

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

```
> Condicion := s(0) = -39/100, D(s)(0) = 0
```

$$Condicion := s(0) = -\frac{39}{100}, D(s)(0) = 0 \tag{2}$$

```
> Hooke := (1348/100)/(35/100); gravedad := (98066/10000); Masa := (16/1000)/(98066/10000)
```

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

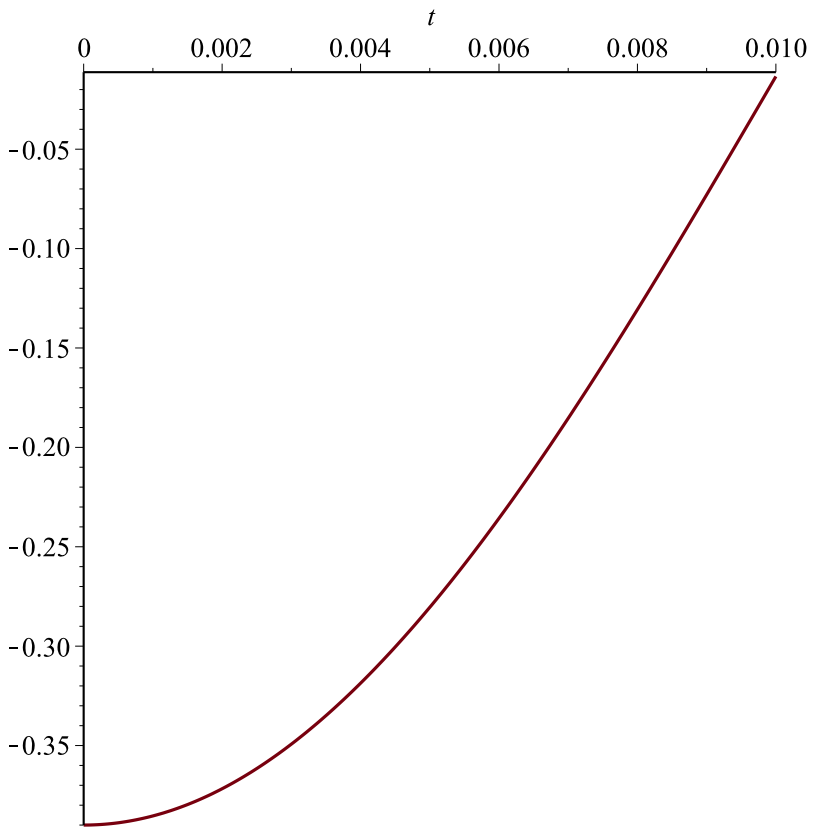
$$gravedad := \frac{49033}{5000}$$

$$Masa := \frac{80}{49033} \tag{3}$$

```
> Solucion := dsolve({EcuacionDinamica, Condicion})
```

$$Solucion := s(t) = -\frac{39}{100} \cos\left(\frac{1}{70} \sqrt{115668847}\, t \right) \tag{4}$$

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



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

$$TiempoEmpuje := \frac{5}{16524121}\,\pi\sqrt{115668847}$$

$$0.01022373805 \qquad \textbf{(5)}$$

> $VelocidadMaxima := subs(t = TiempoEmpuje, rhs(diff(Solucion, t))); evalf(\%); 3.5(\%)$

$$VelocidadMaxima := \frac{39}{7000}\,\sin\left(\frac{1}{2}\,\pi\right)\sqrt{115668847}$$

$$59.92040913$$

$$209.7214320 \qquad \textbf{(6)}$$

TIRO PARABOLICO

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

$$EcuaVertical := \frac{d^2}{dt^2}\,y(t) = -\frac{49033}{5000} \qquad \textbf{(7)}$$

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

$$EcuaHorizontal := \frac{d}{dt}\,x(t) = \frac{39}{14000}\,\sqrt{115668847}\,\sqrt{2} \qquad \textbf{(8)}$$

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

$$CondVertical := y(0) = 2, \mathrm{D}(y)(0) = \frac{39}{14000}\sqrt{115668847}\sqrt{2} \quad (9)$$

> $CondHorizontal := x(0) = 10$

$$CondHorizontal := x(0) = 10 \quad (10)$$

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

$$SolVertical := y(t) = -\frac{49033}{10000}t^2 + \frac{39}{14000}\sqrt{115668847}\sqrt{2}\,t + 2$$

$$y(t) = -4.90\,t^2 + 42.4\,t + 2. \quad (11)$$

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

$$SolHorizontal := x(t) = \frac{39}{14000}\sqrt{231337694}\,t + 10$$

$$x(t) = 42.4\,t + 10. \quad (12)$$

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

$$TiempoVuelo := \frac{195}{686462}\sqrt{115668847}\sqrt{2} - \frac{5}{686462}\sqrt{359553006974},$$

$$\frac{195}{686462}\sqrt{115668847}\sqrt{2} + \frac{5}{686462}\sqrt{359553006974}$$

$$-0.046947999, 8.688093271 \quad (13)$$

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

$$DistanciaMaxima := \frac{39}{14000}\sqrt{231337694}\left(\frac{195}{686462}\sqrt{115668847}\sqrt{2} + \frac{5}{686462}\sqrt{359553006974}\right) + 10$$

$$378.1156208 \quad (14)$$

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

$$TiempoAlturaMax := \frac{195}{686462}\sqrt{115668847}\sqrt{2}$$

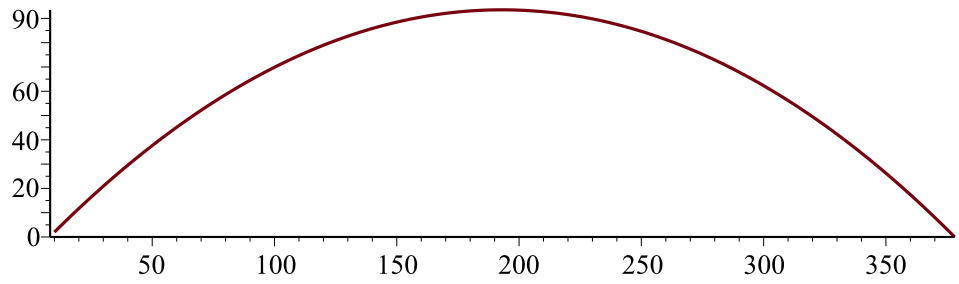
$$4.320572636 \quad (15)$$

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

$$AlturaMax := \frac{523777}{5600}$$

$$93.53160714 \quad (16)$$

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


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