```
> restart
```

PROBLEMA DEL TIRO CON ARCO Y FLECHA (morada)

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

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

```
> Peso_flecha := 20/1000; gravedad := 98/10; Hooke := -(1922/100)/(5/10); Masa_flecha := Peso_flecha/gravedad
```

$$Peso_{flecha} := \frac{1}{50}$$

$$gravedad := \frac{49}{5}$$

$$Hooke := -\frac{961}{25}$$

$$Masa_{flecha} := \frac{1}{490} \tag{2}$$

```
> EcuacionDinamica;
```

$$\frac{1}{490}\,\frac{d^2}{dt^2}\,s(t) = -\frac{961}{25}\,s(t) \tag{3}$$

```
> CondicionesDinamicas := s(0) = -43/100, D(s)(0) = 0
```

$$CondicionesDinamicas := s(0) = -\frac{43}{100},\ D(s)(0) = 0 \tag{4}$$

```
> Empuje_flecha := dsolve({EcuacionDinamica, CondicionesDinamicas})
```

$$Empuje_{flecha} := s(t) = -\frac{43}{100}\cos\left(\frac{217}{5}\sqrt{10}\,t\right) \tag{5}$$

```
> Tiempo_empuje := solve(rhs(Empuje_flecha) = 0, t); evalf(%, 3)
```

$$Tiempo_{empuje} := \frac{1}{868}\,\pi\sqrt{10}$$

$$0.0114 \tag{6}$$

```
> Velocidad_inicial := subs(t = Tiempo_empuje, rhs(diff(Empuje_flecha, t))); evalf(%, 3); evalf(%%, 3)·3.6
```

$$Velocidad_{inicial} := \frac{9331}{500}\sin\left(\frac{1}{2}\,\pi\right)\sqrt{10}$$

$$59.1$$

$$212.76 \tag{7}$$

```
>
```

PROBLEMA TIRO PARABÓLICO

```
> Velocidad_inicial
```

$$\frac{9331}{500}\sqrt{10} \tag{8}$$

> $Ecuacion_{vertical} := diff(y(t), t\$2) = -gravedad;\ Ecuacion_{horizontal} := diff(x(t), t) = Velocidad_{inicial} \cdot \cos\left(\frac{Pi}{4}\right)$

$$Ecuacion_{vertical} := \frac{d^2}{dt^2} y(t) = -\frac{49}{5}$$

$$Ecuacion_{horizontal} := \frac{d}{dt} x(t) = \frac{9331}{1000}\sqrt{10}\sqrt{2} \quad \textbf{(9)}$$

> $Condiciones_{verticales} := y(0) = \frac{21}{10},\ D(y)(0) = Velocidad_{inicial} \cdot \sin\left(\frac{Pi}{4}\right);\ Condicion_{horizontal} := x(0) = 5$

$$Condiciones_{verticales} := y(0) = \frac{21}{10},\ D(y)(0) = \frac{9331}{1000}\sqrt{10}\sqrt{2}$$

$$Condicion_{horizontal} := x(0) = 5 \quad \textbf{(10)}$$

> $Recorrido_{vertical} := dsolve(\{Ecuacion_{vertical}, Condiciones_{verticales}\});\ Recorrido_{horizontal} := dsolve(\{Ecuacion_{horizontal}, Condicion_{horizontal}\})$

$$Recorrido_{vertical} := y(t) = -\frac{49}{10}t^2 + \frac{9331}{1000}\sqrt{10}\sqrt{2}\,t + \frac{21}{10}$$

$$Recorrido_{horizontal} := x(t) = \frac{9331}{500}\sqrt{5}\,t + 5 \quad \textbf{(11)}$$

> $TiempoVuelo := solve(rhs(Recorrido_{vertical}) = 0, t);\ evalf(\%, 3)$

$$TiempoVuelo := \frac{1333}{700}\sqrt{5} - \frac{1}{700}\sqrt{9094445},\ \frac{1333}{700}\sqrt{5} + \frac{1}{700}\sqrt{9094445}$$

$$-0.04,\ 8.56 \quad \textbf{(12)}$$

> $DistanciaMaxima := subs(t = TiempoVuelo_2, rhs(Recorrido_{horizontal}));\ evalf(\%, 3)$

$$DistanciaMaxima := \frac{9331}{500}\sqrt{5}\left(\frac{1333}{700}\sqrt{5} + \frac{1}{700}\sqrt{9094445}\right) + 5$$

$$364. \quad \textbf{(13)}$$

> $TiempoAlturaMaxima := solve(rhs(diff(Recorrido_{vertical}, t)) = 0, t);\ evalf(\%, 3)$

$$TiempoAlturaMaxima := \frac{1333}{1400}\sqrt{10}\sqrt{2}$$

$$4.25 \quad \textbf{(14)}$$

> $AlturaMaxima := subs(t = TiempoAlturaMaxima, rhs(Recorrido_{vertical}));\ evalf(\%, 3)$

$$AlturaMaxima := \frac{1818889}{20000}$$

$$90.9 \quad \textbf{(15)}$$

>