> *restart*

> *EcuacionDiferencial* := *diff*(*y*(*t*), *t*, *t*) + *g* = 0

$$EcuacionDiferencial := \frac{d^2}{dt^2} y(t) + g = 0 \quad (1)$$

> *Solucion* := *dsolve*(*EcuacionDiferencial*, *y*(*t*))

$$Solucion := y(t) = -\frac{1}{2} g t^2 + \_C1\, t + \_C2 \quad (2)$$

> *DerivadaSolucion* := *diff*(*Solucion*, *t*)

$$DerivadaSolucion := \frac{d}{dt} y(t) = -g t + \_C1 \quad (3)$$

> *DerivadaSegundaSolucion* := *diff*(*DerivadaSolucion*, *t*)

$$DerivadaSegundaSolucion := \frac{d^2}{dt^2} y(t) = -g \quad (4)$$

> *Comprobar* := *subs*(*DerivadaSegundaSolucion*, *EcuacionDiferencial*)

$$Comprobar := 0 = 0 \quad (5)$$

> *restart*

> *Digits* := 4

$$Digits := 4 \quad (6)$$

problema de la flecha y el arco

> $Modelo1 := \left(\frac{0.030}{9.8067}\right) diff(s(t), t, t) = -\left(\frac{14.61}{0.40}\right) \cdot s(t)$

$$Modelo1 := 0.003059 \left(\frac{d^2}{dt^2} s(t)\right) = -36.52\, s(t) \quad (7)$$

> *EcuacionDiferencial* := *lhs*(*Modelo1*) − *rhs*(*Modelo1*) = 0

$$EcuacionDiferencial := 0.003059 \left(\frac{d^2}{dt^2} s(t)\right) + 36.52\, s(t) = 0 \quad (8)$$

> *Solucion1* := *dsolve*({*Modelo1*, *s*(0) = −0.436, D(*s*)(0) = 0})

$$Solucion1 := s(t) = -\frac{109}{250} \cos\left(\frac{200}{3059} \sqrt{2792867}\, t\right) \quad (9)$$

> *evalf*(%)

$$s(t) = -0.4360 \cos(109.2\, t) \quad (10)$$

> *TiempoRecorrido* := *solve*(*rhs*(*Solucion1*) = 0, *t*)

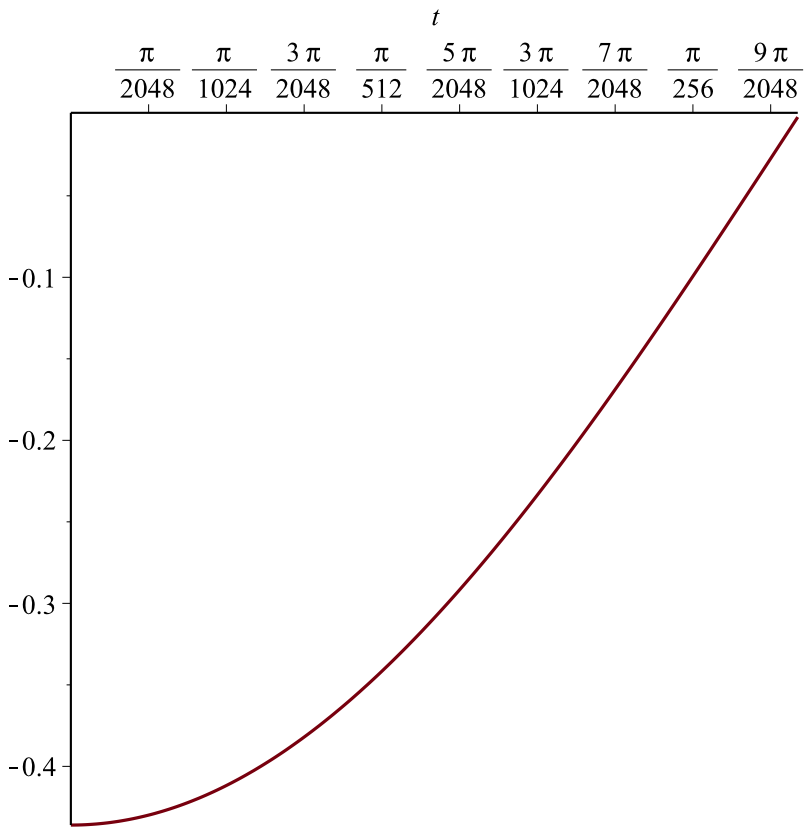
$$TiempoRecorrido := \frac{1}{365200} \pi \sqrt{2792867} \quad (11)$$

> *evalf*(%)

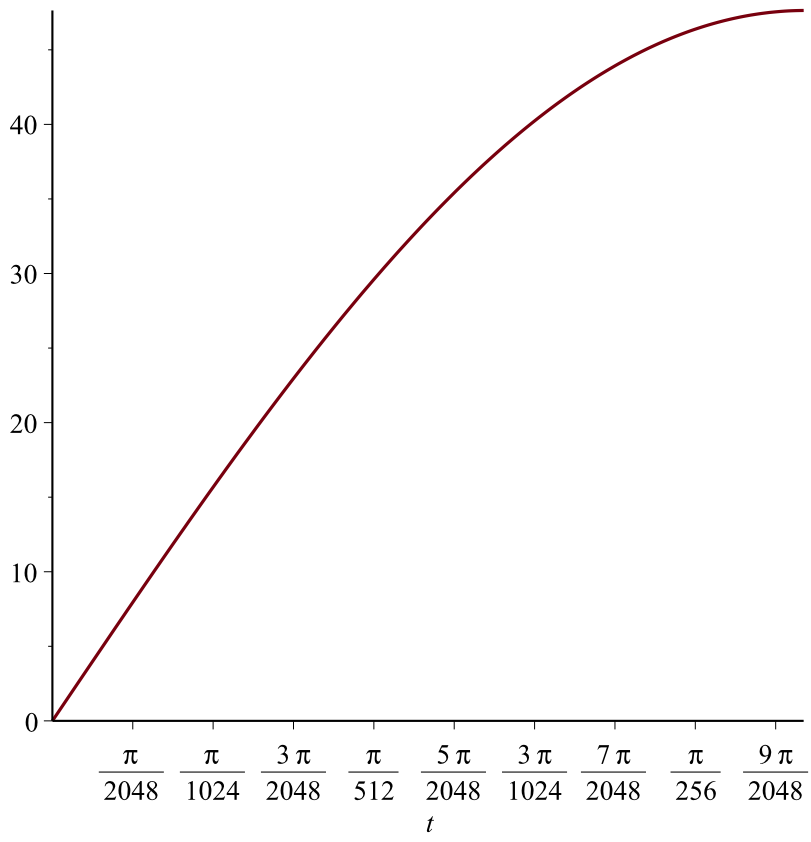
$$0.01437 \quad (12)$$

(segundos)

> *plot*(*rhs*(*Solucion1*), *t* = 0 .. *TiempoRecorrido*)



> $plot(rhs(diff(Solucion1, t)), t = 0..TiempoRecorrido)$



> $VelocidadInicial := rhs(subs(t = TiempoRecorrido, diff(Solucion1, t)))$

$$VelocidadInicial := \frac{436}{15295}\sin\left(\frac{1}{2}\pi\right)\sqrt{2792867} \quad \textbf{(13)}$$

> $evalf(\%)$

$$47.64 \quad \textbf{(14)}$$

(metros/segundos)

> $evalf(\%)\cdot 3.6$

$$171.5 \quad \textbf{(15)}$$

(Kilómetros/hora)

>

Continuando con la clase anterior
TIRO PARABÓLICO

> $EcuaVertical := diff(y(t), t, t) = -9.8067$

$$EcuaVertical := \frac{d^2}{dt^2}y(t) = -9.8067 \quad \textbf{(16)}$$

> $evalf(Pi); eval(pi); eval(PI)$

$$3.142$$
$$\pi$$

$$\Pi \tag{17}$$

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

$$EcuaHorizontal := \frac{d}{dt} x(t) = \frac{218}{15295} \sqrt{2792867}\, \sqrt{2} \tag{18}$$

> $evalf(\%, 4)$

$$\frac{d}{dt} x(t) = 33.67 \tag{19}$$

> $SolucionVertical := dsolve\left(\left\{EcuaVertical, y(0) = 2.0, D(y)(0) = VelocidadInicial \cdot \sin\left(\frac{Pi}{4}\right)\right\}\right)$

$$SolucionVertical := y(t) = -\frac{98067}{20000} t^2 + \frac{218}{15295} \sqrt{2792867}\, \sqrt{2}\, t + 2 \tag{20}$$

> $evalf(\%, 4)$

$$y(t) = -4.903\, t^2 + 33.67\, t + 2. \tag{21}$$

> $SolucionHorizontal := dsolve(\{EcuaHorizontal, x(0) = 5\})$

$$SolucionHorizontal := x(t) = \frac{218}{15295} \sqrt{5585734}\, t + 5 \tag{22}$$

> $evalf(\%, 4)$

$$x(t) = 33.67\, t + 5. \tag{23}$$

> $TiempoVuelo := solve(rhs(SolucionVertical) = 0, t)$

$$TiempoVuelo := \frac{436000}{299986953} \sqrt{2792867}\, \sqrt{2} - \frac{200}{299986953} \sqrt{27463302350827}, \tag{24}$$
$$\frac{436000}{299986953} \sqrt{2792867}\, \sqrt{2} + \frac{200}{299986953} \sqrt{27463302350827}$$

> $evalf(\%, 4)$

$$-0.061, 6.927 \tag{25}$$

> $evalf(TiempoVuelo[2])$

$$6.927 \tag{26}$$

(segundos)

> $DistanciaMaxima := subs(t = TiempoVuelo[2], rhs(SolucionHorizontal))$

$$DistanciaMaxima := \frac{218}{15295} \sqrt{5585734} \left(\frac{436000}{299986953} \sqrt{2792867}\, \sqrt{2} + \frac{200}{299986953} \sqrt{27463302350827}\right) + 5 \tag{27}$$

> $evalf(\%, 5)$

$$238.41 \tag{28}$$

(metros)

> $TiempoAlturaMaxima := solve(rhs(diff(SolucionVertical, t)) = 0, t)$

$$TiempoAlturaMaxima := \frac{436000}{299986953} \sqrt{2792867}\, \sqrt{2} \tag{29}$$

> $evalf(\%)$

$$3.433 \tag{30}$$

(segundos)

> $AlturaMaxima := subs(t = TiempoAlturaMaxima, rhs(SolucionVertical))$

$$AlturaMaxima := \frac{17955738706}{299986953} \quad \textbf{(31)}$$

> *evalf* (%)

$$59.86 \quad \textbf{(32)}$$

(metros)

>