



ECUACIONES DIFERENCIALES CON MAPLE



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CIRCUITO EN SERIE RC

$$Rq' + \frac{1}{C}q = E(t)$$

NOTA: la variable "t" se va a cambiar por la variable "x" debido a que el programa solo acepta como variable independiente la "x"

Ingrese los valores de R, C y E

> $R := 30; C := 0.001; E := 20 \cdot \cos(2 \cdot x)$

$$R := 30$$

$$C := 0.001$$

$$E := 20 \cos(2x)$$

(1)

> $b := \text{convert}\left(\frac{1}{C \cdot R}, \text{rational}\right); F := \frac{E}{R};$

$$b := \frac{100}{3}$$

$$F := \frac{2}{3} \cos(2x)$$

(2)

ecuación diferencial

> $q' + b \cdot q = F$

$$\frac{d}{dx} q(x) + \frac{100}{3} q(x) = \frac{2}{3} \cos(2x)$$

(3)

> $\text{dsolve}((3), \{q(x)\})$

$$q(x) = \frac{50}{2509} \cos(2x) + \frac{3}{2509} \sin(2x) + e^{-\frac{100}{3}x} _C1$$

(4)

Factor integrante

> $F := \int b \, dx$

$$F := \frac{100}{3} x$$

(5)

> $\mu := e^F$

$$\mu := e^{\frac{100}{3}x}$$

(6)

>

Solución complementaria

$$\begin{aligned}
 &> q_- := \text{simplify}\left(\frac{\int \frac{E}{R} \mu \, dx}{\mu}\right) + \text{simplify}\left(\frac{cI}{\mu}\right) \\
 &\quad q_- := \frac{50}{2509} \cos(2x) + \frac{3}{2509} \sin(2x) + cI e^{-\frac{100}{3}x}
 \end{aligned} \tag{7}$$

$$\begin{aligned}
 &> \text{solve}(\{ \text{eval}(q_-, x=0) = 0 \}, \{ cI \}) \\
 &\quad \left\{ cI = -\frac{50}{2509} \right\}
 \end{aligned} \tag{8}$$

$$\begin{aligned}
 &> \text{dsolve}[:, -\text{interactive}']((3)) \\
 &\quad q(x) = \frac{50}{2509} \cos(2x) + \frac{3}{2509} \sin(2x) - \frac{50}{2509} e^{-\frac{100}{3}x}
 \end{aligned} \tag{9}$$

Función de carga

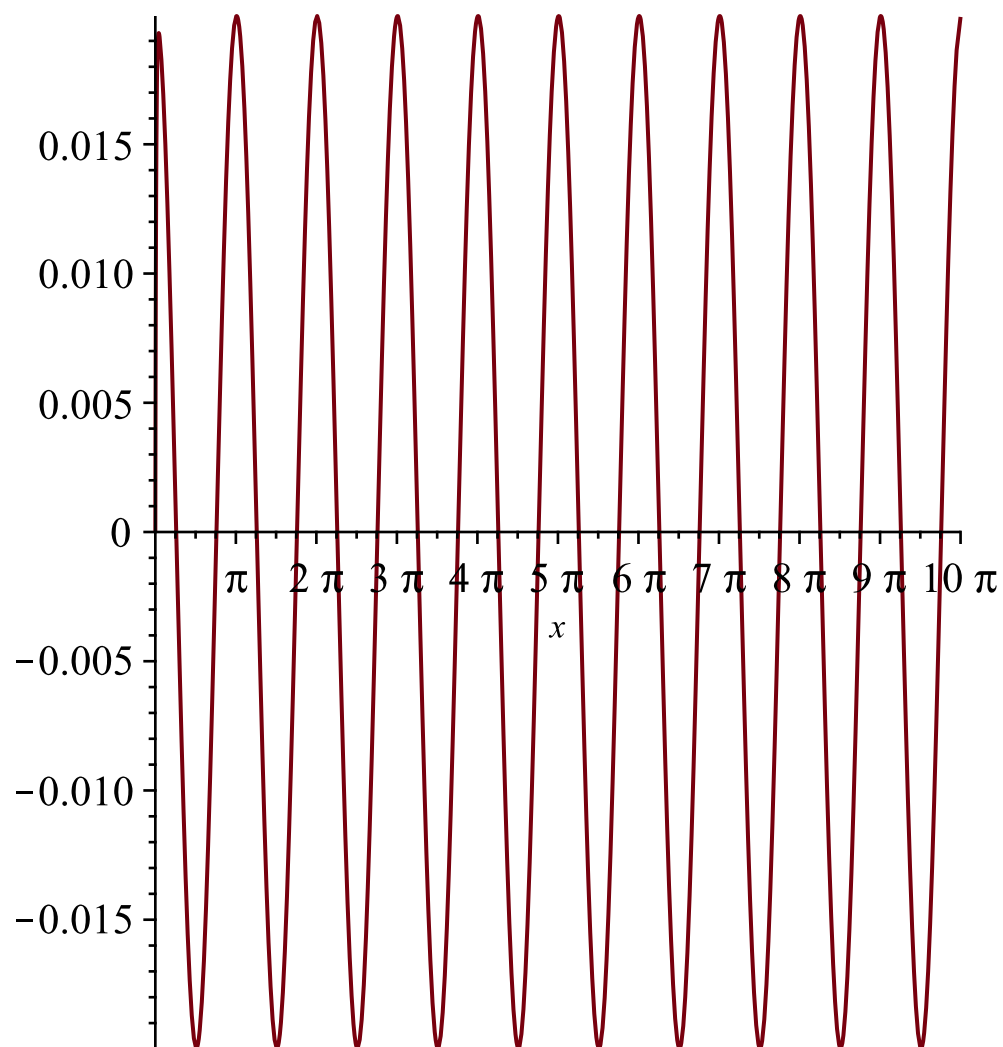
$$\begin{aligned}
 &> qf := \frac{50}{2509} \cos(2x) + \frac{3}{2509} \sin(2x) - \frac{50}{2509} e^{-\frac{100}{3}x} \\
 &\quad qf := \frac{50}{2509} \cos(2x) + \frac{3}{2509} \sin(2x) - \frac{50}{2509} e^{-\frac{100}{3}x}
 \end{aligned} \tag{10}$$

Función de corriente

$$\begin{aligned}
 &> i := \frac{d}{dx}(qf) \\
 &\quad i := -\frac{100}{2509} \sin(2x) + \frac{6}{2509} \cos(2x) + \frac{5000}{7527} e^{-\frac{100}{3}x}
 \end{aligned} \tag{11}$$

Grafica de la función de carga q(t)

$$> \text{plot}(qf, x=0..10 * \text{Pi});$$



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>
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Grafica de la función de corriente $i(t)$

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> plot(i, x=0..10 * Pi);
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