CIRCUITO EN SERIE RC

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

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

Ingrese los valores de R, C y E

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

$$R := 30$$
$$C := 0.001$$
$$E := 20\cos(2x) \quad \textbf{(1)}$$

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

$$b := \frac{100}{3}$$
$$F := \frac{2}{3}\cos(2x) \quad \textbf{(2)}$$

ecuación diferencial

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

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

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

$$q(x) = \frac{50}{2509}\cos(2x) + \frac{3}{2509}\sin(2x) + e^{-\frac{100}{3}x}\_C1 \quad \textbf{(4)}$$

Factor integrante

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

$$F := \frac{100}{3}x \quad \textbf{(5)}$$

> $\mu := e^{F}$

$$\mu := e^{\frac{100}{3}x} \quad \textbf{(6)}$$

>

Solución complementaria

> $q\_ := simplify\left(\frac{\int \frac{E}{R}\mu\, dx}{\mu}\right) + simplify\left(\frac{c1}{\mu}\right)$

$$q\_ := \frac{50}{2509}\cos(2x) + \frac{3}{2509}\sin(2x) + c1\, e^{-\frac{100}{3}x} \quad \textbf{(7)}$$

> $solve(\{eval(q\_, x=0)=0\}, \{c1\})$

$$\left\{c1 = -\frac{50}{2509}\right\} \quad \textbf{(8)}$$

> $dsolve[':\text{-}interactive'](\textbf{(3)})$

$$q(x) = \frac{50}{2509}\cos(2x) + \frac{3}{2509}\sin(2x) - \frac{50}{2509}e^{-\frac{100}{3}x} \quad \textbf{(9)}$$

Función de carga

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

$$qf := \frac{50}{2509}\cos(2x) + \frac{3}{2509}\sin(2x) - \frac{50}{2509}e^{-\frac{100}{3}x} \quad \textbf{(10)}$$

Función de corriente

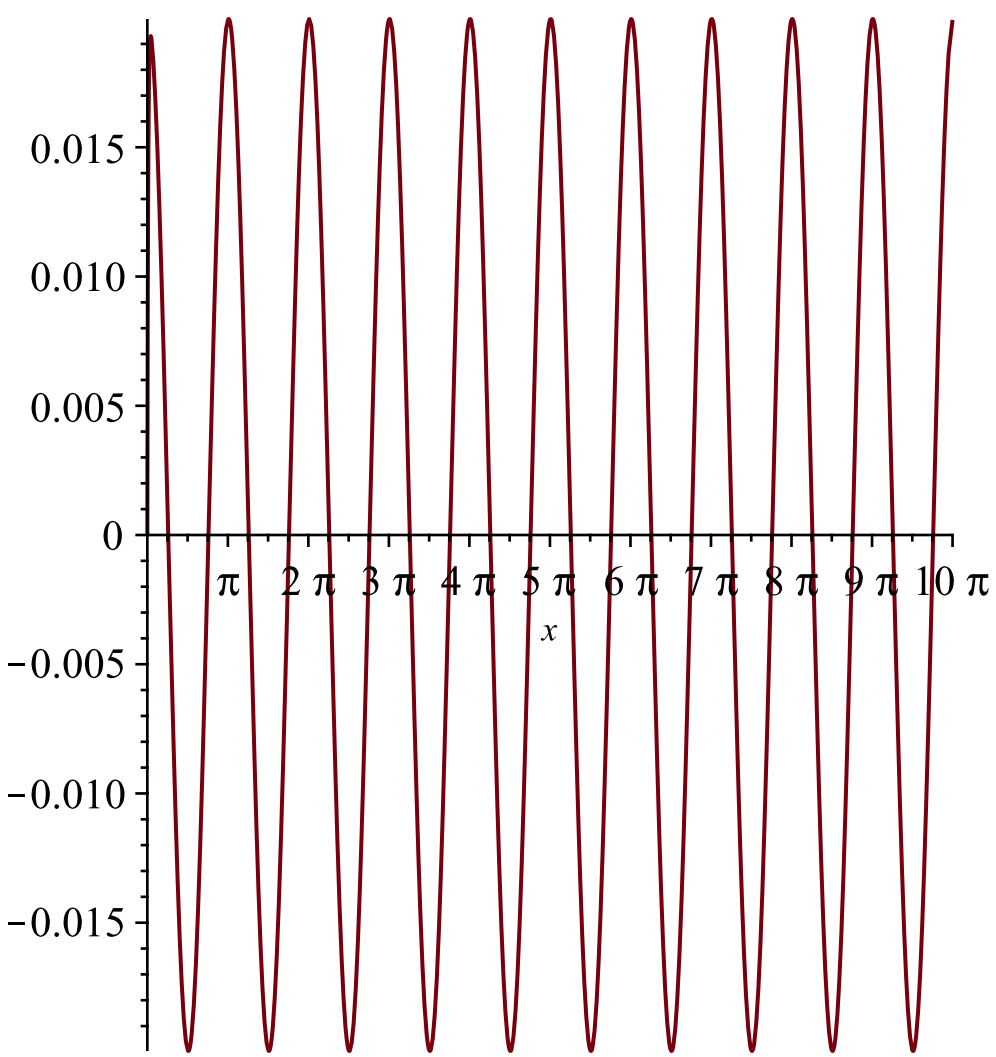
> $i := \frac{d}{dx}(qf)$

$$i := -\frac{100}{2509}\sin(2x) + \frac{6}{2509}\cos(2x) + \frac{5000}{7527}e^{-\frac{100}{3}x} \quad \textbf{(11)}$$

>

Grafica de la función de carga q(t)

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



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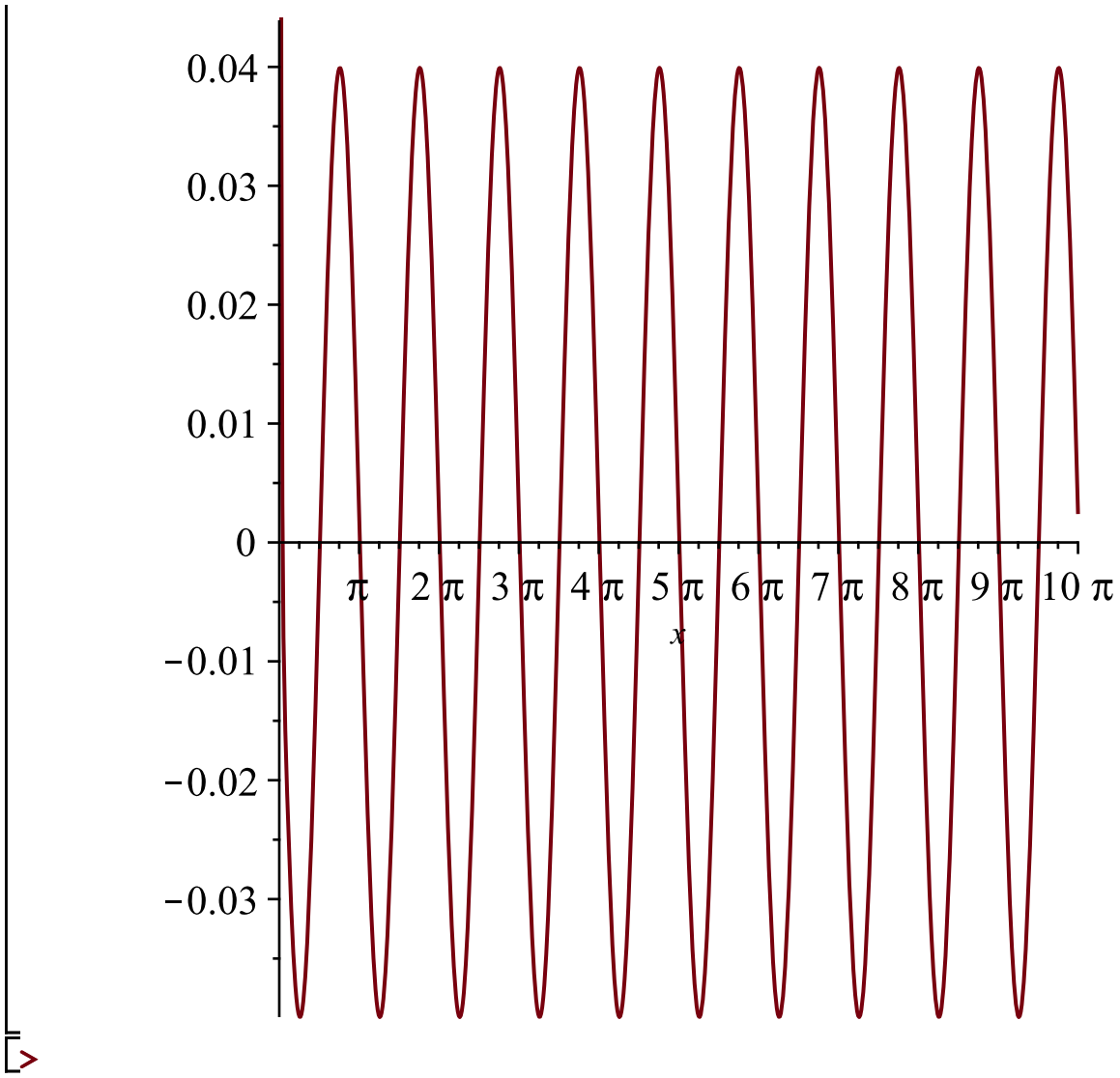
Grafica de la función de corriente i(t)

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


0.04
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
π
2 π
3 π
4 π
5 π
6 π
7 π
8 π
9 π
10 π
x