

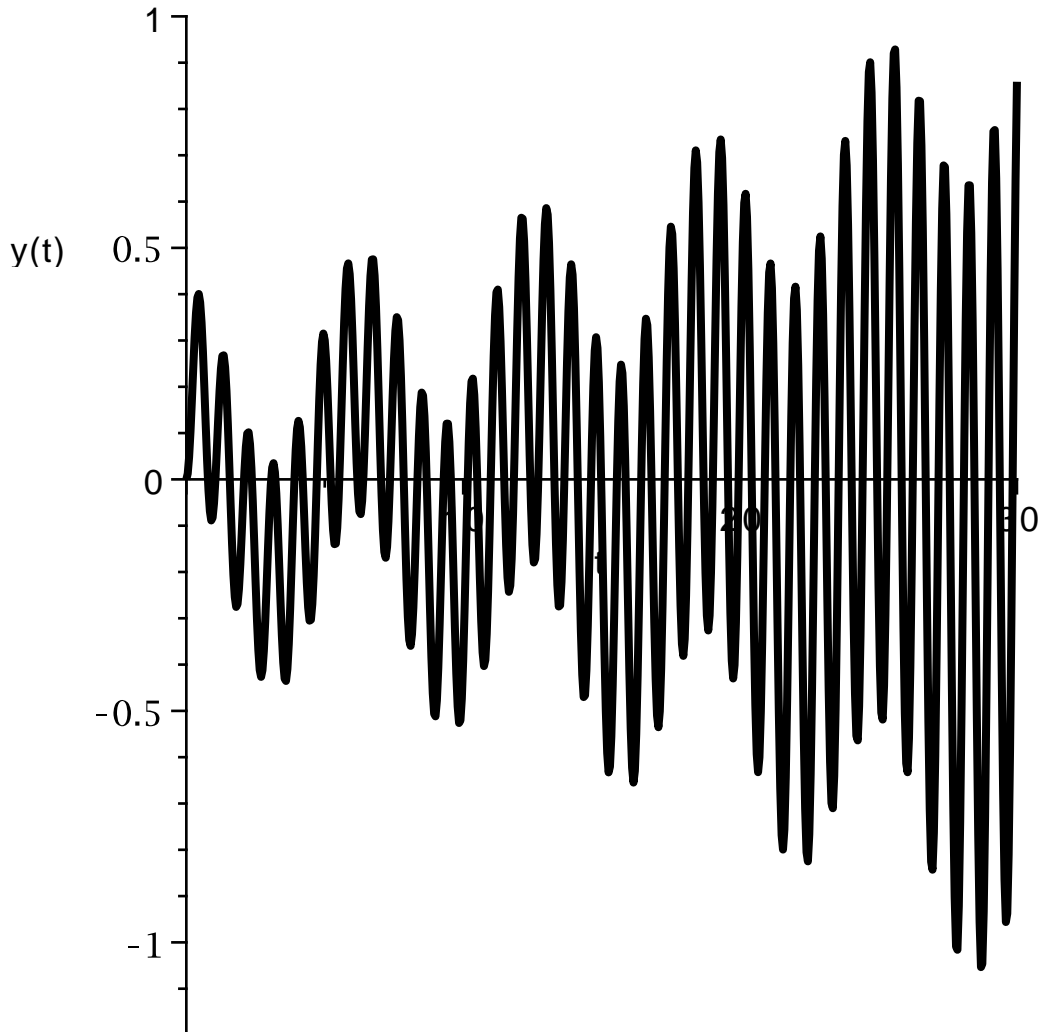
with(DEtools) :

**2nd order NON-homogeneous linear differential equation with DAMPING:**

$$\begin{aligned} & \text{evalf}(\text{dsolve}(\{\text{diff}(y(t), \text{\`}\$`(t, 2)) - 0.1 \cdot \text{diff}(y(t), t) + 49 * y(t) = 10 \cdot \cos(t)\}, y(t))) \\ & \{y(t) = e^{0.05000000000 t} \sin(6.999821425 t) \_C2 \\ & \quad + e^{0.05000000000 t} \cos(6.999821425 t) \_C1 - 0.004340258940 \sin(t) \\ & \quad + 2.083324291 \cos(t)\} \end{aligned} \tag{1}$$

$$\begin{aligned} & \text{evalf}(\text{dsolve}(\{\text{diff}(y(t), \text{\`}\$`(t, 2)) - 0.1 \cdot \text{diff}(y(t), t) + 49 * y(t) = 10 \cdot \cos(t), y(0) = 0, \\ & \quad (D(y))(0) = 0\}, y(t))) \\ & y(t) = 0.001550132022 e^{0.05000000000 t} \sin(6.999821425 t) \\ & \quad - 0.2083324291 e^{0.05000000000 t} \cos(6.999821425 t) \\ & \quad - 0.0004340258940 \sin(t) + 0.2083324291 \cos(t) \end{aligned} \tag{2}$$

*DEplot(diff(y(t), `\\$`(t, 2)) - 0.1 · diff(y(t), t) + 49\*y(t) = 10 · cos(t), y(t), t = -0 .. 30, [[y(0) = 0, (D(y))(0) = 0]], y = -1.2 .. 1.2, stepsize = 0.5e-1, linecolor = black)*



$$\text{evalf}(\text{dsolve}(\{\text{diff}(y(t), \text{\`}\$`(t, 2)) - 0.1 * (\text{diff}(y(t), t)) + 49 * y(t) = 10 * \cos(t), y(0) = 0,$$

$$\begin{aligned}
 & (D(y))(0) = 5, y(t)) \\
 y(t) = & 0.7158540685 e^{0.05000000000 t} \sin(6.999821425 t) \\
 & - 0.2083324291 e^{0.05000000000 t} \cos(6.999821425 t) \\
 & - 0.0004340258940 \sin(t) + 0.2083324291 \cos(t)
 \end{aligned} \tag{3}$$

$D\text{Eplot}(\text{diff}(y(t), `\$`(t, 2)) - .1 * (\text{diff}(y(t), t)) + 49 * y(t) = 10 * \cos(t), y(t), t = 0 .. 30,$   
 $[[y(0) = 0, (D(y))(0) = 5]], y = -4 .. 4, \text{stepsize} = 0.5\text{e-}1, \text{linecolor} = \text{black})$

