

$$\begin{aligned} &> \text{restart} \\ &> \text{SolGral} := y(x) = _C1 \cdot \exp(2 \cdot x) + _C2 \cdot \exp(x) \cdot \cos(3 \cdot x) + _C3 \cdot \exp(x) \cdot \sin(3 \cdot x) \\ &\quad \text{SolGral} := y(x) = _C1 e^{2x} + _C2 e^x \cos(3x) + _C3 e^x \sin(3x) \end{aligned} \quad (1)$$

$$\begin{aligned} &> \text{DerSolGral} := \text{diff}(\text{SolGral}, x) \\ \text{DerSolGral} &:= \frac{d}{dx} y(x) = 2 _C1 e^{2x} + _C2 e^x \cos(3x) - 3 _C2 e^x \sin(3x) + _C3 e^x \sin(3x) \\ &\quad + 3 _C3 e^x \cos(3x) \end{aligned} \quad (2)$$

$$\begin{aligned} &> \text{DerDerSolGral} := \text{diff}(\text{SolGral}, x\$2) \\ \text{DerDerSolGral} &:= \frac{d^2}{dx^2} y(x) = 4 _C1 e^{2x} - 8 _C2 e^x \cos(3x) - 6 _C2 e^x \sin(3x) \\ &\quad - 8 _C3 e^x \sin(3x) + 6 _C3 e^x \cos(3x) \end{aligned} \quad (3)$$

$$\begin{aligned} &> \text{DerDerDerSolGral} := \text{diff}(\text{SolGral}, x\$3) \\ \text{DerDerDerSolGral} &:= \frac{d^3}{dx^3} y(x) = 8 _C1 e^{2x} - 26 _C2 e^x \cos(3x) + 18 _C2 e^x \sin(3x) \\ &\quad - 26 _C3 e^x \sin(3x) - 18 _C3 e^x \cos(3x) \end{aligned} \quad (4)$$

> with(linalg) :

$$\begin{aligned} &> \text{Para} := \text{solve}(\{\text{DerSolGral}, \text{DerDerSolGral}, \text{DerDerDerSolGral}\}, \{_C1, _C2, _C3\}) \\ \text{Para} &:= \left\{ \begin{aligned} _C1 &= \frac{1}{20} \frac{\frac{d^3}{dx^3} y(x) - 2 \left(\frac{d^2}{dx^2} y(x) \right) + 10 \left(\frac{d}{dx} y(x) \right)}{e^{2x}}, _C2 \\ &= \frac{1}{30} \frac{1}{e^x (\cos(3x)^2 + \sin(3x)^2)} \left(\left(\frac{d^3}{dx^3} y(x) \right) \sin(3x) - 3 \left(\frac{d^2}{dx^2} y(x) \right) \cos(3x) \right. \\ &\quad \left. + 6 \cos(3x) \left(\frac{d}{dx} y(x) \right) - 3 \left(\frac{d^2}{dx^2} y(x) \right) \sin(3x) + 2 \sin(3x) \left(\frac{d}{dx} y(x) \right) \right), _C3 = \\ &= -\frac{1}{30} \frac{1}{e^x (\cos(3x)^2 + \sin(3x)^2)} \left(\left(\frac{d^3}{dx^3} y(x) \right) \cos(3x) - 3 \left(\frac{d^2}{dx^2} y(x) \right) \cos(3x) \right. \\ &\quad \left. + 2 \cos(3x) \left(\frac{d}{dx} y(x) \right) + 3 \left(\frac{d^2}{dx^2} y(x) \right) \sin(3x) - 6 \sin(3x) \left(\frac{d}{dx} y(x) \right) \right) \end{aligned} \right\} \end{aligned} \quad (5)$$

$$\begin{aligned} &> \text{EcuaDif} := \text{simplify}(\text{subs}(_C1 = \text{rhs}(\text{Para}[1]), _C2 = \text{rhs}(\text{Para}[2]), _C3 = \text{rhs}(\text{Para}[3])), \\ &\quad \text{SolGral})) \cdot 20 \\ \text{EcuaDif} &:= 20 y(x) = \frac{d^3}{dx^3} y(x) - 4 \left(\frac{d^2}{dx^2} y(x) \right) + 14 \left(\frac{d}{dx} y(x) \right) \end{aligned} \quad (6)$$

$$\begin{aligned} &> \text{EcuaDifFinal} := \text{rhs}(\text{EcuaDif}) - \text{lhs}(\text{EcuaDif}) = 0 \\ \text{EcuaDifFinal} &:= \frac{d^3}{dx^3} y(x) - 4 \left(\frac{d^2}{dx^2} y(x) \right) + 14 \left(\frac{d}{dx} y(x) \right) - 20 y(x) = 0 \end{aligned} \quad (7)$$

$$\begin{aligned} &> \text{SolGralDos} := \text{dsolve}(\text{EcuaDifFinal}) \\ \text{SolGralDos} &:= y(x) = _C1 e^{2x} + _C2 e^x \sin(3x) + _C3 e^x \cos(3x) \end{aligned} \quad (8)$$

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|> restart
|=
|> Ecua := y''''-8 y''' + 33 y''-68 y' + 52 y = 0
|   Ecua :=  $\frac{d^4}{dx^4} y(x) - 8 \left( \frac{d^3}{dx^3} y(x) \right) + 33 \left( \frac{d^2}{dx^2} y(x) \right) - 68 \left( \frac{d}{dx} y(x) \right) + 52 y(x) = 0$  (9)
|=
|> Sol := dsolve(Ecua)
|   Sol :=  $y(x) = \_C1 e^{2x} + \_C2 e^{2x} x + \_C3 e^{2x} \sin(3 x) + \_C4 e^{2x} \cos(3 x)$  (10)
|=
|>

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