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> restart :
> Ecuacion :=  $\frac{d}{dt} y(t) - \frac{y(t)}{t} = \frac{e^t}{\ln(t)} + t;$ 
      Ecuacion :=  $\frac{d}{dt} y(t) - \frac{y(t)}{t} = \frac{e^t}{\ln(t)} + t$  (1)
>  $p(t) := -\frac{1}{t}; q(t) := \text{rhs}(Ecuacion);$ 
       $p(t) := -\frac{1}{t}$ 
       $q(t) := \frac{e^t}{\ln(t)} + t$  (2)
> SolucionHomogenea :=  $y(t) = C1 \cdot \exp(-\int p(t), t);$ 
      SolucionHomogenea :=  $y(t) = C1 t$  (3)
> ParteNoHomogenea :=  $\exp(-\int p(t), t) \cdot \int (\text{simplify}(\exp(\int p(t), t)) \cdot q(t), t), t);$ 
      ParteNoHomogenea :=  $t \left( t + \int \frac{e^t}{t \ln(t)} dt \right)$  (4)
> SolucionGeneral :=  $y(t) = \text{rhs}(SolucionHomogenea) + ParteNoHomogenea$ 
      SolucionGeneral :=  $y(t) = C1 t + t \left( t + \int \frac{e^t}{t \ln(t)} dt \right)$  (5)
> dsolve(Ecuacion);
      
$$y(t) = \frac{\int \frac{(e^t + t \ln(t)) t}{\ln(t)} dt + _C1}{t}$$
 (6)
> restart :
> Ecuacion :=  $\frac{d^4}{dt^4} y(t) + 5 \left( \frac{d^2}{dt^2} y(t) \right) - 4 y(t) = 5 e^{-3t} \cos(2 t);$ 
      Ecuacion :=  $\frac{d^4}{dt^4} y(t) + 5 \left( \frac{d^2}{dt^2} y(t) \right) - 4 y(t) = 5 e^{-3t} \cos(2 t)$  (7)
> EcuaCarac :=  $m \cdot 4 + 5 \cdot m \cdot 2 - 4 = 0;$ 
      EcuaCarac :=  $m^4 + 5 m^2 - 4 = 0$  (8)
> Raiz := solve(EcuaCarac);
      
$$\text{Raiz} := -\frac{1}{2} \sqrt{-10 + 2 \sqrt{41}}, \frac{1}{2} \sqrt{-10 + 2 \sqrt{41}}, -\frac{1}{2} i \sqrt{10 + 2 \sqrt{41}},$$

      
$$\frac{1}{2} i \sqrt{10 + 2 \sqrt{41}}$$
 (9)
> Sol1 :=  $\exp(\text{Raiz}_1 \cdot t); \text{evalf}(\%, 2);$ 
      
$$\text{Sol}_1 := e^{-\frac{1}{2} \sqrt{-10 + 2 \sqrt{41}} t}$$

      
$$e^{-0.85 t}$$
 (10)
> Sol2 :=  $\exp(\text{Raiz}_2 \cdot t); \text{evalf}(\%, 2);$ 

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$$Sol_2 := e^{\frac{1}{2} \sqrt{-10 + 2\sqrt{41}} t} e^{0.85 t} \quad (11)$$

$$\begin{aligned} &> Sol_3 := \exp(\operatorname{Re}(Raiz_4) \cdot t) \cdot \cos(\operatorname{Im}(Raiz_4) \cdot t); \operatorname{evalf}(\%, 2); \\ &Sol_3 := \cos\left(\frac{1}{2} \sqrt{10 + 2\sqrt{41}} t\right) \cos(2.4 t) \end{aligned} \quad (12)$$

$$\begin{aligned} &> Sol_4 := \exp(\operatorname{Re}(Raiz_4) \cdot t) \cdot \sin(\operatorname{Im}(Raiz_4) \cdot t); \operatorname{evalf}(\%, 2); \\ &Sol_4 := \sin\left(\frac{1}{2} \sqrt{10 + 2\sqrt{41}} t\right) \sin(2.4 t) \end{aligned} \quad (13)$$

$$\begin{aligned} &> SolucionHomogenea := y(t) = C1 \cdot Sol_1 + C2 \cdot Sol_2 + C3 \cdot Sol_3 + C4 \cdot Sol_4; \\ SolucionHomogenea &:= y(t) = C1 e^{-\frac{1}{2} \sqrt{-10 + 2\sqrt{41}} t} + C2 e^{\frac{1}{2} \sqrt{-10 + 2\sqrt{41}} t} \\ &+ C3 \cos\left(\frac{1}{2} \sqrt{10 + 2\sqrt{41}} t\right) + C4 \sin\left(\frac{1}{2} \sqrt{10 + 2\sqrt{41}} t\right) \end{aligned} \quad (14)$$

$$\begin{aligned} &> y(0) = 2; D(y)(0) = -3; D^{(2)}(y)(0) = 4; D^{(3)}(y)(0) = -5; \\ &y(0) = 2 \\ &D(y)(0) = -3 \\ &D^{(2)}(y)(0) = 4 \\ &D^{(3)}(y)(0) = -5 \end{aligned} \quad (15)$$

$$\begin{aligned} &> sistema := \operatorname{eval}(\operatorname{subs}(t=0, \operatorname{rhs}(SolucionHomogenea))) = 2, \operatorname{eval}(\operatorname{subs}(t=0, \\ &\operatorname{rhs}(\operatorname{diff}(SolucionHomogenea, t)))) = -3, \operatorname{eval}(\operatorname{subs}(t=0, \operatorname{rhs}(\operatorname{diff}(SolucionHomogenea, t \\ &\$2)))) = 4, \operatorname{eval}(\operatorname{subs}(t=0, \operatorname{rhs}(\operatorname{diff}(SolucionHomogenea, t\$3)))) = -5 : \end{aligned}$$

$$\begin{aligned} &> \operatorname{evalf}(sistema_1, 2); \operatorname{evalf}(sistema_2, 2); \operatorname{evalf}(sistema_3, 2); \operatorname{evalf}(sistema_4, 2); \\ &C1 + C2 + C3 = 2. \\ &-0.85 C1 + 0.85 C2 + 2.4 C4 = -3. \\ &0.75 C1 + 0.75 C2 - 5.8 C3 = 4. \\ &-0.59 C1 + 0.59 C2 - 13. C4 = -5. \end{aligned} \quad (16)$$

$$\begin{aligned} &> SOL := \operatorname{solve}(\{sistema\}, \{C1, C2, C3, C4\}); \operatorname{evalf}(SOL_1, 2); \operatorname{evalf}(SOL_2, 2); \operatorname{evalf}(SOL_3, \\ &2); \operatorname{evalf}(SOL_4, 2); \\ &C1 = 3.1 \\ &C2 = -0.84 \\ &C3 = -0.41 \\ &C4 = 0.20 \end{aligned} \quad (17)$$