> $restart:$

> $H(s) := \dfrac{40\,e^{-2s}}{(s-3)\,(s-2)^3}$

$$H(s) := \frac{40\,e^{-2s}}{(s-3)\,(s-2)^3} \tag{1}$$

> $F(s) := \dfrac{40}{(s-3)};\ G(s) := \dfrac{\exp(-2\,s)}{(s-2)\cdot\cdot 3};$

$$F(s) := \frac{40}{s-3}$$

$$G(s) := \frac{e^{-2s}}{(s-2)^3} \tag{2}$$

> $with(inttrans):$

> $f(t) := invlaplace(F(s), s, t);$

$$f(t) := 40\,e^{3t} \tag{3}$$

> $g(t) := invlaplace(G(s), s, t);$

$$g(t) := \frac{1}{2}\,\mathrm{Heaviside}(t-2)\,(t-2)^2\,e^{2t-4} \tag{4}$$

> $h(t) := simplify\left(int\left(40\cdot\exp(3\cdot(t-\mathrm{tau})).\left(\dfrac{1}{2}\right)\cdot\mathrm{Heaviside}(\mathrm{tau}-2)\cdot(\mathrm{tau}-2)\cdot\cdot 2\cdot\exp(2\cdot\mathrm{tau}-4), \mathrm{tau}=0\,..t\right)\right);$

$$h(t) := -20\,\mathrm{Heaviside}(t-2)\,\left(2\,e^{2t-4} - 2\,e^{2t-4}\,t + e^{2t-4}\,t^2 - 2\,e^{3t-6}\right) \tag{5}$$

> $comprobacion := invlaplace(H(s), s, t);$

$$comprobacion := 20\,\mathrm{Heaviside}(t-2)\,\left(2\,e^{3t-6} - e^{2t-4}\,(t^2-2\,t+2)\right) \tag{6}$$

> $invlaplace\left(\dfrac{\exp(-s)}{s}, s, t\right);$

$$\mathrm{Heaviside}(t-1) \tag{7}$$

> $restart:$

> $sistema := \dfrac{d}{dt}\,y_1(t) = 2\,y_1(t) + 2\,y_2(t),\ \dfrac{d}{dt}\,y_2(t) = 4\,y_1(t) + 4\,y_2(t) : sistema_1;\ sistema_2;$

$$\frac{d}{dt}\,y_1(t) = 2\,y_1(t) + 2\,y_2(t)$$

$$\frac{d}{dt}\,y_2(t) = 4\,y_1(t) + 4\,y_2(t) \tag{8}$$

> $AA := array([[2, 2], [4, 4]]);$

$$AA := \begin{bmatrix} 2 & 2 \\ 4 & 4 \end{bmatrix} \tag{9}$$

> $II := array([[1, 0], [0, 1]]);$

$$II := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \tag{10}$$

> $sImenosAA := evalm(s\cdot II - AA);$

$$sImenosAA := \begin{bmatrix} s-2 & -2 \\ -4 & s-4 \end{bmatrix} \quad (11)$$

> with(linalg) :

> INVsImenosAA := inverse(sImenosAA);

$$INVsImenosAA := \begin{bmatrix} \frac{s-4}{s\,(s-6)} & \frac{2}{s\,(s-6)} \\ \frac{4}{s\,(s-6)} & \frac{s-2}{s\,(s-6)} \end{bmatrix} \quad (12)$$

> with(inttrans) :

> MatExp := map(invlaplace, INVsImenosAA, s, t);

$$MatExp := \begin{bmatrix} \frac{2}{3} + \frac{1}{3}\,e^{6\,t} & \frac{1}{3}\,e^{6\,t} - \frac{1}{3} \\ \frac{2}{3}\,e^{6\,t} - \frac{2}{3} & \frac{1}{3} + \frac{2}{3}\,e^{6\,t} \end{bmatrix} \quad (13)$$

> ExpMat := exponential(AA, t);

$$ExpMat := \begin{bmatrix} \frac{2}{3} + \frac{1}{3}\,e^{6\,t} & \frac{1}{3}\,e^{6\,t} - \frac{1}{3} \\ \frac{2}{3}\,e^{6\,t} - \frac{2}{3} & \frac{1}{3} + \frac{2}{3}\,e^{6\,t} \end{bmatrix} \quad (14)$$

> restart :

> with(PDEtools);

[CanonicalCoordinates, ChangeSymmetry, CharacteristicQ, CharacteristicQInvariants, ConservedCurrentTest, ConservedCurrents, ConsistencyTest, D_Dx, DeterminingPDE, Eta_k, Euler, FromJet, InfinitesimalGenerator, Infinitesimals, IntegratingFactorTest, IntegratingFactors, InvariantSolutions, InvariantTransformation, Invariants, Laplace, Library, PDEplot, PolynomialSolutions, ReducedForm, SimilaritySolutions, SimilarityTransformation, SymmetrySolutions, SymmetryTest, SymmetryTransformation, TWSolutions, ToJet, build, casesplit, charstrip, dchange, dcoeffs, declare, diff_table, difforder, dpolyform, dsubs, mapde, separability, splitstrip, splitsys, undeclare] **(15)**

> EcuacionDerivadasParciales := diff(F(x, y), x\$2) − 6·diff(F(x, y), x, y) + 8·diff(F(x, y), y\$2) = 0;

$$EcuacionDerivadasParciales := \frac{\partial^2}{\partial x^2} F(x, y) - 6 \left(\frac{\partial^2}{\partial y\, \partial x} F(x, y) \right) + 8 \left(\frac{\partial^2}{\partial y^2} F(x, y) \right) = 0 \quad (16)$$

> Solucion := pdsolve(EcuacionDerivadasParciales);

$$Solucion := F(x, y) = \_F1(y + 2\,x) + \_F2(y + 4\,x) \quad (17)$$

> EDenDP := diff(y(x, t), t\$2) + 4·diff(y(x, t), x, t) + 4·diff(y(x, t), x\$2) = 0;

$$EDenDP := \frac{\partial^2}{\partial t^2} y(x, t) + 4 \left(\frac{\partial^2}{\partial x\, \partial t} y(x, t) \right) + 4 \left(\frac{\partial^2}{\partial x^2} y(x, t) \right) = 0 \quad (18)$$

> SOL := pdsolve(EDenDP);

$$SOL := y(x, t) = \_F1(2\,t - x) + \_F2(2\,t - x)\, x \quad (19)$$

>

$$\frac{\partial T(x,t)}{\partial x^2} + \frac{\partial T(x,t)}{\partial t} = T(x,y)$$

> $ED := diff\,(T(x,t), x\$2) + diff\,(T(x,t), t) = T(x,t);$

$$ED := \frac{\partial^2}{\partial x^2}\, T(x,t) + \frac{\partial}{\partial t}\, T(x,t) = T(x,t) \tag{20}$$

> $SolGral := build(pdsolve(ED));$

$$SolGral := T(x,t) = \frac{e^{\sqrt{\_c_1}\, x}\, \_C3\, e^{t}\, \_C1}{e^{t\, \_c_1}} + \frac{\_C3\, e^{t}\, \_C2}{e^{\sqrt{\_c_1}\, x}\, e^{t\, \_c_1}} \tag{21}$$

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