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> restart
> Int(cos(2·tau)2, tau = 0 .. t) = int(cos(2·tau)2, tau = 0 .. t)

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$$\int_0^t \cos(2\tau)^2 d\tau = \frac{\cos(2t) \sin(2t)}{4} + \frac{t}{2} \quad (1)$$

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> Int(cos(2·tau)·sin(2·tau), tau = 0 .. t) = int(cos(2·tau)·sin(2·tau), tau = 0 .. t)

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$$\int_0^t \cos(2\tau) \sin(2\tau) d\tau = \frac{1}{4} - \frac{\cos(2t)^2}{4} \quad (2)$$

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> F := s / (s2 + 4)2

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$$F := \frac{s}{(s^2 + 4)^2} \quad (3)$$

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> with(inttrans) :
> f := invlaplace(F, s, t)

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$$f := \frac{t \sin(2t)}{4} \quad (4)$$

```

> restart
> Ecua := y'' - 4·y = exp(2·x) - 4·cos(2 x)

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$$Ecua := \frac{d^2}{dx^2} y(x) - 4 y(x) = e^{2x} - 4 \cos(2x) \quad (5)$$

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> EcuaHom := lhs(Ecua) = 0

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$$EcuaHom := \frac{d^2}{dx^2} y(x) - 4 y(x) = 0 \quad (6)$$

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> Q := rhs(Ecua)

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$$Q := e^{2x} - 4 \cos(2x) \quad (7)$$

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> EcuaCarac := m2 - 4 = 0

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$$EcuaCarac := m^2 - 4 = 0 \quad (8)$$

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> Raiz := solve(EcuaCarac)

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$$Raiz := 2, -2 \quad (9)$$

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> yy[1] := exp(Raiz[1]·x)

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$$yy_1 := e^{2x} \quad (10)$$

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> yy[2] := exp(Raiz[2]·x)

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$$yy_2 := e^{-2x} \quad (11)$$

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> with(linalg) :
> WW := wronskian([yy[1], yy[2]], x)

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$$WW := \begin{bmatrix} e^{2x} & e^{-2x} \\ 2e^{2x} & -2e^{-2x} \end{bmatrix} \quad (12)$$

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> BB := array([0, Q])

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$$BB := \begin{bmatrix} 0 & e^{2x} - 4 \cos(2x) \end{bmatrix} \quad (13)$$

> Para := linsolve(WW, BB)

$$Para := \begin{bmatrix} \frac{e^{2x} - 4 \cos(2x)}{4 e^{2x}} & -\frac{e^{2x} - 4 \cos(2x)}{4 e^{-2x}} \end{bmatrix} \quad (14)$$

> Aprima := Para[1]

$$Aprima := \frac{e^{2x} - 4 \cos(2x)}{4 e^{2x}} \quad (15)$$

> Bprima := Para[2]

$$Bprima := -\frac{e^{2x} - 4 \cos(2x)}{4 e^{-2x}} \quad (16)$$

> SolGral := y(x) = simplify((int(Aprima, x) + _C1)·yy[1] + (int(Bprima, x) + _C2)·yy[2])

$$SolGral := y(x) = \frac{(4x + 16_C1 - 1)e^{2x}}{16} + e^{-2x}_C2 + \cos(x)^2 - \frac{1}{2} \quad (17)$$

> restart

> Ecua := (x^2 + 1)·y'' - 2·x·y' + 2·y = 0

$$Ecua := (x^2 + 1) \left(\frac{d^2}{dx^2} y(x) \right) - 2x \left(\frac{d}{dx} y(x) \right) + 2y(x) = 0 \quad (18)$$

> EcuaNorm := expand(simplify((lhs(Ecua) / (x^2 + 1)))) = 0

$$EcuaNorm := \frac{\left(\frac{d^2}{dx^2} y(x) \right) x^2}{x^2 + 1} - \frac{2x \left(\frac{d}{dx} y(x) \right)}{x^2 + 1} + \frac{\frac{d^2}{dx^2} y(x)}{x^2 + 1} + \frac{2y(x)}{x^2 + 1} = 0 \quad (19)$$

> EcuaNormDos := diff(y(x), x\$2) - \frac{2·x·diff(y(x), x)}{(x^2 + 1)} + \frac{2·y(x)}{(x^2 + 1)} = 0

$$EcuaNormDos := \frac{d^2}{dx^2} y(x) - \frac{2x \left(\frac{d}{dx} y(x) \right)}{x^2 + 1} + \frac{2y(x)}{x^2 + 1} = 0 \quad (20)$$

> yy[1] := x

$$yy_1 := x \quad (21)$$

> yy[2] := x^2 - 1

$$yy_2 := x^2 - 1 \quad (22)$$

> yy[3] := 3·x^2 + x - 3

$$yy_3 := 3x^2 + x - 3 \quad (23)$$

> with(linalg) :

> AA := wronskian([yy[1], yy[2]], x)

$$(24)$$

$$AA := \begin{bmatrix} x & x^2 - 1 \\ 1 & 2x \end{bmatrix} \quad (24)$$

> DetAA := det(AA)

$$DetAA := x^2 + 1 \quad (25)$$

> BB := wronskian([yy[2], yy[3]], x)

$$BB := \begin{bmatrix} x^2 - 1 & 3x^2 + x - 3 \\ 2x & 6x + 1 \end{bmatrix} \quad (26)$$

> DetBB := det(BB)

$$DetBB := -x^2 - 1 \quad (27)$$

> CC := wronskian([yy[1], yy[3]], x)

$$CC := \begin{bmatrix} x & 3x^2 + x - 3 \\ 1 & 6x + 1 \end{bmatrix} \quad (28)$$

> DetCC := det(CC)

$$DetCC := 3x^2 + 3 \quad (29)$$

> ComprobarUno := eval(subs(y(x) = yy[1], EcuaNormDos))

$$ComprobarUno := 0 = 0 \quad (30)$$

> ComprobarDos := simplify(eval(subs(y(x) = yy[2], EcuaNormDos)))

$$ComprobarDos := 0 = 0 \quad (31)$$

> ComprobarTres := simplify(eval(subs(y(x) = yy[3], EcuaNormDos)))

$$ComprobarTres := 0 = 0 \quad (32)$$

> EcuaNoHom := lhs(EcuaNormDos) = $\frac{(6 \cdot (x^2 + 1)^2)}{(x^2 + 1)}$

$$EcuaNoHom := \frac{d^2}{dx^2} y(x) - \frac{2x \left(\frac{d}{dx} y(x) \right)}{x^2 + 1} + \frac{2y(x)}{x^2 + 1} = 6x^2 + 6 \quad (33)$$

> Q := rhs(EcuaNoHom)

$$Q := 6x^2 + 6 \quad (34)$$

> with(linalg) :

> WW := wronskian([yy[1], yy[2]], x)

$$WW := \begin{bmatrix} x & x^2 - 1 \\ 1 & 2x \end{bmatrix} \quad (35)$$

> BB := array([0, Q])

$$BB := \begin{bmatrix} 0 & 6x^2 + 6 \end{bmatrix} \quad (36)$$

> Para := linsolve(WW, BB)

$$Para := \begin{bmatrix} -6x^2 + 6 & 6x \end{bmatrix} \quad (37)$$

> Aprima := Para[1]

$$Aprima := -6x^2 + 6 \quad (38)$$

> Bprima := Para[2]

$$Bprima := 6x \quad (39)$$

> SolGralNoHom := y(x) = simplify((int(Aprima, x) + _C1)·yy[1] + (int(Bprima, x) + _C2)·yy[2])

$$SolGralNoHom := y(x) = x^4 + (_C2 + 3)x^2 + _C1x - _C2 \quad (40)$$

> ComprobarFinal := simplify(eval(subs(y(x) = rhs(SolGralNoHom), EcuaNoHom)))

$$ComprobarFinal := 6x^2 + 6 = 6x^2 + 6 \quad (41)$$

> restart

> with(inttrans) :

> f := Heaviside(t - 4) · 120 · cos(60 · (t - 4))

$$f := 120 \text{ Heaviside}(t - 4) \cos(60t - 240) \quad (42)$$

> II := $\frac{\text{laplace}(f, t, s)}{s + 2}$

$$II := \frac{120 e^{-4s} s}{(s^2 + 3600)(s + 2)} \quad (43)$$

>

>

> with(inttrans) :

> Corriente := simplify(invlaplace(II, s, t))

$$Corriente := \frac{1}{901} \left(34587645138205409280 \text{ Heaviside}(t - 4) \left(\frac{1}{576460752303423488} \right. \right. \quad (44)$$

$$\begin{aligned} & - \frac{e^{-2t+8}}{576460752303423488} + \frac{67425 \cos(t-4)^4}{72057594037927936} - \frac{225 \cos(t-4)^2}{72057594037927936} \\ & + \frac{4005045 \cos(t-4)^8}{562949953421312} - \frac{31465 \cos(t-4)^6}{281474976710656} + \frac{8778937275 \cos(t-4)^{16}}{4398046511104} \\ & - \frac{154740375 \cos(t-4)^{14}}{1099511627776} + \frac{521532375 \cos(t-4)^{12}}{70368744177664} - \frac{19669221 \cos(t-4)^{10}}{70368744177664} \\ & + \cos(t-4)^{60} - \frac{1925 \cos(t-4)^{54}}{4} + \frac{855 \cos(t-4)^{56}}{8} - 15 \cos(t-4)^{58} \\ & - \frac{5453175 \cos(t-4)^{46}}{512} + \frac{14348425 \cos(t-4)^{48}}{2048} - \frac{948753 \cos(t-4)^{50}}{256} \\ & + \frac{393525 \cos(t-4)^{52}}{256} - \frac{1114894755 \cos(t-4)^{38}}{131072} + \frac{3081683451 \cos(t-4)^{40}}{262144} \\ & - \frac{447398875 \cos(t-4)^{42}}{32768} + \frac{434156625 \cos(t-4)^{44}}{32768} - \frac{73460171295 \cos(t-4)^{26}}{2147483648} \\ & + \frac{284123731305 \cos(t-4)^{28}}{2147483648} - \frac{7184738033 \cos(t-4)^{30}}{16777216} \end{aligned}$$

$$\begin{aligned}
& + \frac{156441876525 \cos(t-4)^{32}}{134217728} - \frac{44896866525 \cos(t-4)^{34}}{16777216} \\
& + \frac{87085668085 \cos(t-4)^{36}}{16777216} - \frac{11992143075 \cos(t-4)^{18}}{549755813888} \\
& + \frac{103384896615 \cos(t-4)^{20}}{549755813888} - \frac{11188841625 \cos(t-4)^{22}}{8589934592} \\
& + \frac{126320400375 \cos(t-4)^{24}}{17179869184} + 30 \sin(t-4) \cos(t-4)^{59} - 435 \sin(t-4) \cos(t-4)^{57} \\
& + \frac{5985 \sin(t-4) \cos(t-4)^{55}}{2} - \frac{51975 \sin(t-4) \cos(t-4)^{53}}{4} \\
& + \frac{5115825 \sin(t-4) \cos(t-4)^{51}}{128} - \frac{23718825 \sin(t-4) \cos(t-4)^{49}}{256} \\
& + \frac{43045275 \sin(t-4) \cos(t-4)^{47}}{256} - \frac{125423025 \sin(t-4) \cos(t-4)^{45}}{512} \\
& + \frac{4775722875 \sin(t-4) \cos(t-4)^{43}}{16384} - \frac{9395376375 \sin(t-4) \cos(t-4)^{41}}{32768} \\
& + \frac{15408417255 \sin(t-4) \cos(t-4)^{39}}{65536} - \frac{21183000345 \sin(t-4) \cos(t-4)^{37}}{131072} \\
& + \frac{783771012765 \sin(t-4) \cos(t-4)^{35}}{8388608} - \frac{763246730925 \sin(t-4) \cos(t-4)^{33}}{16777216} \\
& + \frac{156441876525 \sin(t-4) \cos(t-4)^{31}}{8388608} - \frac{107771070495 \sin(t-4) \cos(t-4)^{29}}{16777216} \\
& + \frac{1988866119135 \sin(t-4) \cos(t-4)^{27}}{1073741824} - \frac{954982226835 \sin(t-4) \cos(t-4)^{25}}{2147483648} \\
& + \frac{378961201125 \sin(t-4) \cos(t-4)^{23}}{4294967296} - \frac{123077257875 \sin(t-4) \cos(t-4)^{21}}{8589934592} \\
& + \frac{516924483075 \sin(t-4) \cos(t-4)^{19}}{274877906944} - \frac{107929287675 \sin(t-4) \cos(t-4)^{17}}{549755813888} \\
& + \frac{8778937275 \sin(t-4) \cos(t-4)^{15}}{549755813888} - \frac{1083182625 \sin(t-4) \cos(t-4)^{13}}{1099511627776} \\
& + \frac{1564597125 \sin(t-4) \cos(t-4)^{11}}{3518437208832} - \frac{98346105 \sin(t-4) \cos(t-4)^9}{70368744177664} \\
& + \frac{4005045 \sin(t-4) \cos(t-4)^7}{140737488355328} - \frac{94395 \sin(t-4) \cos(t-4)^5}{281474976710656} \\
& + \frac{67425 \sin(t-4) \cos(t-4)^3}{36028797018963968} - \frac{225 \sin(t-4) \cos(t-4)}{72057594037927936} \Big) \Big)
\end{aligned}$$



