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> restart
> Ecua := y'' - 5·y' + 6·y = 3·exp(2·x)

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$$Ecua := \frac{d^2}{dx^2} y(x) - 5 \frac{d}{dx} y(x) + 6 y(x) = 3 e^{2x} \quad (1)$$

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> Cond := y(0) = 3, D(y)(0) = 5

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$$Cond := y(0) = 3, D(y)(0) = 5 \quad (2)$$

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> with(inttrans) :
> EcuaTL := subs(Cond, laplace(Ecua, x, s))

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$$EcuaTL := s^2 \mathcal{L}(y(x), x, s) + 10 - 3s - 5s \mathcal{L}(y(x), x, s) + 6 \mathcal{L}(y(x), x, s) = \frac{3}{s-2} \quad (3)$$

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> SolPartTL := isolate(EcuaTL, laplace(y(x), x, s))

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$$SolPartTL := \mathcal{L}(y(x), x, s) = \frac{\frac{3}{s-2} + 3s - 10}{s^2 - 5s + 6} \quad (4)$$

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> SolPart := invlaplace(SolPartTL, s, x)

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$$SolPart := y(x) = 2 e^{3x} - e^{2x} (-1 + 3x) \quad (5)$$

```

> restart
> Ecua := diff(y(x, t), t$2) + diff(y(x, t), x, t) = 2·x^3·diff(y(x, t), t)

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$$Ecua := \frac{\partial^2}{\partial t^2} y(x, t) + \frac{\partial^2}{\partial t \partial x} y(x, t) = 2 x^3 \left( \frac{\partial}{\partial t} y(x, t) \right) \quad (6)$$

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> alpha := 0

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$$\alpha := 0 \quad (7)$$

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> y(x, t) = F(x)·G(t)

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$$y(x, t) = F(x) G(t) \quad (8)$$

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> EcuaSeparable := eval(subs(y(x, t) = F(x)·G(t), Ecua))

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$$EcuaSeparable := F(x) \left( \frac{d^2}{dt^2} G(t) \right) + \left( \frac{d}{dx} F(x) \right) \left( \frac{d}{dt} G(t) \right) = 2 x^3 F(x) \left( \frac{d}{dt} G(t) \right) \quad (9)$$

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> EcuaSeparada :=

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$$EcuaSeparada := \frac{\left( lhs(EcuaSeparable) - \left( \frac{d}{dx} F(x) \right) \left( \frac{d}{dt} G(t) \right) \right)}{F(x) \cdot diff(G(t), t)}$$

$$= simplify \left( \frac{\left( rhs(EcuaSeparable) - \left( \frac{d}{dx} F(x) \right) \left( \frac{d}{dt} G(t) \right) \right)}{F(x) \cdot diff(G(t), t)} \right)$$

$$EcuaSeparada := \frac{\frac{d^2}{dt^2} G(t)}{\frac{d}{dt} G(t)} = \frac{2 x^3 F(x) - \frac{d}{dx} F(x)}{F(x)} \quad (10)$$

```

> restart
> Ecua := diff(y[1](x), x$2) - 5·y[1](x) = 4·exp(2·x) + 3·x

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$$(11)$$

$$Ecua := \frac{d^2}{dx^2} y_1(x) - 5 y_1(x) = 4 e^{2x} + 3 x \quad (11)$$

$$> EcuaHom := lhs(Ecua) = 0$$

$$EcuaHom := \frac{d^2}{dx^2} y_1(x) - 5 y_1(x) = 0 \quad (12)$$

$$> Q := rhs(Ecua)$$

$$Q := 4 e^{2x} + 3 x \quad (13)$$

$$> EcuaCarac := m^2 - 5 = 0$$

$$EcuaCarac := m^2 - 5 = 0 \quad (14)$$

$$> Para := solve(EcuaCarac)$$

$$Para := \sqrt{5}, -\sqrt{5} \quad (15)$$

$$> yy[11] := \exp(Para[1] \cdot x)$$

$$yy_{11} := e^{\sqrt{5} x} \quad (16)$$

$$> yy[12] := \exp(Para[2] \cdot x)$$

$$yy_{12} := e^{-\sqrt{5} x} \quad (17)$$

$$> SolGralHom := y[1](x) = \_C1 \cdot yy[11] + \_C2 \cdot yy[12]$$

$$SolGralHom := y_1(x) = \_C1 e^{\sqrt{5} x} + \_C2 e^{-\sqrt{5} x} \quad (18)$$

$$> SolNoHom := y[1](x) = A \cdot yy[11] + B \cdot yy[12]$$

$$SolNoHom := y_1(x) = A e^{\sqrt{5} x} + B e^{-\sqrt{5} x} \quad (19)$$

$$> Sist := Aprima \cdot yy[11] + Bprima \cdot yy[12] = 0, Aprima \cdot diff(yy[11], x) + Bprima \cdot diff(yy[12], x) = Q : Sist[1]; Sist[2]$$

$$Aprima e^{\sqrt{5} x} + Bprima e^{-\sqrt{5} x} = 0$$

$$Aprima \sqrt{5} e^{\sqrt{5} x} - Bprima \sqrt{5} e^{-\sqrt{5} x} = 4 e^{2x} + 3 x \quad (20)$$

$$> with(linalg) :$$

$$> Parametros := simplify(solve([Sist]))$$

$$Parametros := \left\{ Aprima = \frac{(4 e^{2x} + 3 x) \sqrt{5} e^{-\sqrt{5} x}}{10}, Bprima = -\frac{(4 e^{2x} + 3 x) \sqrt{5} e^{\sqrt{5} x}}{10}, x = x \right\} \quad (21)$$

$$> A := int(rhs(Parametros[1]), x) + \_C1$$

$$A := \frac{\sqrt{5} \left( -\frac{3 \sqrt{5} x}{5 e^{\sqrt{5} x}} - \frac{3}{5 e^{\sqrt{5} x}} + \frac{4 e^{-\sqrt{5} x + 2x}}{-\sqrt{5} + 2} \right)}{10} + \_C1 \quad (22)$$

$$> B := int(rhs(Parametros[2]), x) + \_C2$$

$$B := - \frac{\sqrt{5} \left( \frac{3 e^{\sqrt{5} x} \sqrt{5} x}{5} - \frac{3 e^{\sqrt{5} x}}{5} + \frac{4 e^{\sqrt{5} x + 2 x}}{\sqrt{5} + 2} \right)}{10} + \_C2 \quad (23)$$

**>** *SolFinal* := simplify(*SolNoHom*)

$$SolFinal := y_1(x) = \_C1 e^{\sqrt{5} x} + \_C2 e^{-\sqrt{5} x} - 4 e^{2 x} - \frac{3 x}{5} \quad (24)$$

**>**