```
> restart
> Ecua := diff(u(x,y),x$2) - 4·diff(u(x,y),x,y) + 4·diff(u(x,y),y$2) = 0
```

$$Ecua := \frac{\partial^2}{\partial x^2} u(x,y) - 4\left(\frac{\partial^2}{\partial y\,\partial x} u(x,y)\right) + 4\left(\frac{\partial^2}{\partial y^2} u(x,y)\right) = 0 \quad (1)$$

```
> SolGralUno := u(x,y) = _F1(2·x+y) + x·_F2(2·x+y)
```

$$SolGralUno := u(x,y) = \_F1(2x+y) + x\,\_F2(2x+y) \quad (2)$$

```
> SolGralDos := u(x,y) = _F1(2·x+y) + y·_F2(2·x+y)
```

$$SolGralDos := u(x,y) = \_F1(2x+y) + y\,\_F2(2x+y) \quad (3)$$

```
> ComprobarUno := simplify(eval(subs(u(x,y) = rhs(SolGralUno), Ecua)))
```

$$ComprobarUno := 0 = 0 \quad (4)$$

```
> ComprobarDos := simplify(eval(subs(u(x,y) = rhs(SolGralDos), Ecua)))
```

$$ComprobarDos := 0 = 0 \quad (5)$$

```
> SolGralMaple := pdsolve(Ecua)
```

$$SolGralMaple := u(x,y) = \_F1(2x+y) + x\,\_F2(2x+y) \quad (6)$$

```
> restart
> Ecua := diff(u(x,t),t$3) = 4·diff(u(x,t),t,x)
```

$$Ecua := \frac{\partial^3}{\partial t^3} u(x,t) = 4\left(\frac{\partial^2}{\partial x\,\partial t} u(x,t)\right) \quad (7)$$

```
> EcuaDos := eval(subs(u(x,t) = F(x)·G(t), Ecua))
```

$$EcuaDos := F(x)\left(\frac{d^3}{dt^3} G(t)\right) = 4\left(\frac{d}{dx} F(x)\right)\left(\frac{d}{dt} G(t)\right) \quad (8)$$

```
> EcuaSep := simplify(lhs(EcuaDos)/(4·F(x)·diff(G(t),t))) = simplify(rhs(EcuaDos)/(4·F(x)·diff(G(t),t)))
```

$$EcuaSep := \frac{1}{4}\,\frac{\frac{d^3}{dt^3} G(t)}{\frac{d}{dt} G(t)} = \frac{\frac{d}{dx} F(x)}{F(x)} \quad (9)$$

```
> EcuaAlphaT := lhs(EcuaSep) = alpha
```

$$EcuaAlphaT := \frac{1}{4}\,\frac{\frac{d^3}{dt^3} G(t)}{\frac{d}{dt} G(t)} = \alpha \quad (10)$$

```
> EcuaAlphaX := rhs(EcuaSep) = alpha
```

$$EcuaAlphaX := \frac{\frac{d}{dx} F(x)}{F(x)} = \alpha \quad (11)$$

```
> EcuaCeroT := subs(alpha = 0, EcuaAlphaT)
```

$$EcuaCeroT := \frac{1}{4}\,\frac{\frac{d^3}{dt^3} G(t)}{\frac{d}{dt} G(t)} = 0 \quad (12)$$

```
> EcuaCeroX := subs(alpha = 0, EcuaAlphaX)
```

$$EcuaCeroX := \frac{\frac{d}{dx} F(x)}{F(x)} = 0 \quad (13)$$

> $SolCeroT := dsolve(EcuaCeroT)$

$$SolCeroT := G(t) = \frac{1}{2} \_C1\, t^2 + \_C2\, t + \_C3 \quad (14)$$

> $SolCeroX := dsolve(EcuaCeroX)$

$$SolCeroX := F(x) = \_C1 \quad (15)$$

> $SolGralCero := u(x,t) = subs(\_C1 = 1, rhs(SolCeroX)) \cdot rhs(SolCeroT)$

$$SolGralCero := u(x,t) = \frac{1}{2} \_C1\, t^2 + \_C2\, t + \_C3 \quad (16)$$

> $EcuaPosT := subs(\mathrm{alpha} = \beta^2, EcuaAlphaT)$

$$EcuaPosT := \frac{1}{4} \frac{\frac{d^3}{dt^3} G(t)}{\frac{d}{dt} G(t)} = \beta^2 \quad (17)$$

> $EcuaPosX := subs(\mathrm{alpha} = \beta^2, EcuaAlphaX)$

$$EcuaPosX := \frac{\frac{d}{dx} F(x)}{F(x)} = \beta^2 \quad (18)$$

> $SolPosT := dsolve(EcuaPosT)$

$$SolPosT := G(t) = \_C1 + \_C2\, e^{2\beta t} + \_C3\, e^{-2\beta t} \quad (19)$$

> $SolPosX := dsolve(EcuaPosX)$

$$SolPosX := F(x) = \_C1\, e^{\beta^2 x} \quad (20)$$

> $SolGralPos := u(x,t) = subs(\_C1 = 1, rhs(SolPosX)) \cdot rhs(SolPosT)$

$$SolGralPos := u(x,t) = e^{\beta^2 x} \left(\_C1 + \_C2\, e^{2\beta t} + \_C3\, e^{-2\beta t} \right) \quad (21)$$

> $EcuaNegT := subs(\mathrm{alpha} = -\beta^2, EcuaAlphaT)$

$$EcuaNegT := \frac{1}{4} \frac{\frac{d^3}{dt^3} G(t)}{\frac{d}{dt} G(t)} = -\beta^2 \quad (22)$$

> $EcuaNegX := subs(\mathrm{alpha} = -\beta^2, EcuaAlphaX)$

$$EcuaNegX := \frac{\frac{d}{dx} F(x)}{F(x)} = -\beta^2 \quad (23)$$

> $SolNegT := dsolve(EcuaNegT)$

$$SolNegT := G(t) = \_C1 + \_C2 \sin(2\beta t) + \_C3 \cos(2\beta t) \quad (24)$$

> $SolNegX := dsolve(EcuaNegX)$

$$SolNegX := F(x) = \_C1\, e^{-\beta^2 x} \quad (25)$$

> $SolGralNeg := u(x,t) = subs(\_C1 = 1, rhs(SolNegX)) \cdot rhs(SolNegT)$

$$SolGralNeg := u(x,t) = e^{-\beta^2 x}\left(\_C1 + \_C2\sin(2\beta t) + \_C3\cos(2\beta t)\right) \quad (26)$$

> $Ecua$

$$\frac{\partial^3}{\partial t^3}u(x,t) = 4\left(\frac{\partial^2}{\partial x\,\partial t}u(x,t)\right) \quad (27)$$

> $ComprobarCero := simplify(eval(subs(u(x,t) = rhs(SolGralCero), lhs(Ecua) - rhs(Ecua) = 0)))$

$$ComprobarCero := 0 = 0 \quad (28)$$

> $ComprobarPos := simplify(eval(subs(u(x,t) = rhs(SolGralPos), lhs(Ecua) - rhs(Ecua) = 0)))$

$$ComprobarPos := 0 = 0 \quad (29)$$

> $ComprobarNeg := simplify(eval(subs(u(x,t) = rhs(SolGralNeg), lhs(Ecua) - rhs(Ecua) = 0)))$

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