> $restart$

> $Ecua := diff(z(x,y), x\$2) + 4\cdot diff(z(x,y), x, y) + 4\cdot diff(z(x,y), y\$2) = 0$

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

> $SolUno := pdsolve(Ecua)$

$$SolUno := z(x,y) = \_F1(y-2x) + \_F2(y-2x)\,x \quad \textbf{(2)}$$

> $SolDos := z(x,y) = \_F1(y-2x) + \_F2(y-2x)\cdot y$

$$SolDos := z(x,y) = \_F1(y-2x) + \_F2(y-2x)\,y \quad \textbf{(3)}$$

> $CompUno := eval(subs(z(x,y) = rhs(SolUno), Ecua))$

$$CompUno := 0 = 0 \quad \textbf{(4)}$$

> $CompDos := eval(subs(z(x,y) = rhs(SolDos), Ecua))$

$$CompDos := 0 = 0 \quad \textbf{(5)}$$

> $EcuaTres := factor(eval(subs(z(x,y) = f(y + m\cdot x), Ecua)))$

$$EcuaTres := \mathrm{D}^{(2)}(f)\,(m\,x + y)\,(m+2)^2 = 0 \quad \textbf{(6)}$$

> $EcuaCarac := (m+2)\cdot\cdot 2 = 0$

$$EcuaCarac := (m+2)^2 = 0 \quad \textbf{(7)}$$

> $Raiz := solve(EcuaCarac)$

$$Raiz := -2, -2 \quad \textbf{(8)}$$

> $SolTres := z(x,y) = f[1](y - 2\cdot x) + f[2](y - 2\cdot x)\cdot x$

$$SolTres := z(x,y) = f_1(y-2x) + f_2(y-2x)\,x \quad \textbf{(9)}$$

> $SolTresBis := z(x,y) = f[1](y - 2\cdot x) + f[2](y - 2\cdot x)\cdot y$

$$SolTresBis := z(x,y) = f_1(y-2x) + f_2(y-2x)\,y \quad \textbf{(10)}$$

> $EcuaCuatro := eval(subs(z(x,y) = F(x)\cdot G(y), Ecua))$

$$EcuaCuatro := \left(\frac{d^2}{dx^2} F(x)\right) G(y) + 4\left(\frac{d}{dx} F(x)\right)\left(\frac{d}{dy} G(y)\right) + 4\,F(x)\left(\frac{d^2}{dy^2} G(y)\right) = 0 \quad \textbf{(11)}$$

> $EcuaCinco := eval(subs(z(x,y) = F(x) + G(y), Ecua))$

$$EcuaCinco := \frac{d^2}{dx^2} F(x) + 4\left(\frac{d^2}{dy^2} G(y)\right) = 0 \quad \textbf{(12)}$$

> $EcuaSeis := lhs(EcuaCinco) - 4\left(\frac{d^2}{dy^2} G(y)\right) = rhs(EcuaCinco) - 4\left(\frac{d^2}{dy^2} G(y)\right)$

$$EcuaSeis := \frac{d^2}{dx^2} F(x) = -4\left(\frac{d^2}{dy^2} G(y)\right) \quad \textbf{(13)}$$

> $EcuaX := lhs(EcuaSeis) = \mathrm{alpha}$

$$EcuaX := \frac{d^2}{dx^2} F(x) = \alpha \quad \textbf{(14)}$$

> $EcuaY := rhs(EcuaSeis) = \mathrm{alpha}$

$$EcuaY := -4\left(\frac{d^2}{dy^2} G(y)\right) = \alpha \quad \textbf{(15)}$$

> $SolXcero := dsolve(subs(\mathrm{alpha} = 0, EcuaX))$

$$SolXcero := F(x) = \_C1\,x + \_C2 \quad \textbf{(16)}$$

> $SolYcero := dsolve(subs(\text{alpha} = 0, EcuaY))$

$$SolYcero := G(y) = \_C1\, y + \_C2 \tag{17}$$

> $SolGralCero := z(x, y) = rhs(SolXcero) + subs(\_C1 = \_C3, \_C2 = \_C4, rhs(SolYcero))$

$$SolGralCero := z(x, y) = \_C1\, x + \_C3\, y + \_C2 + \_C4 \tag{18}$$

> $CompSeis := eval(subs(z(x, y) = rhs(SolGralCero), Ecua))$

$$CompSeis := 0 = 0 \tag{19}$$

> $SolXpos := dsolve(subs(\text{alpha} = \text{beta} \cdot \cdot 2, EcuaX))$

$$SolXpos := F(x) = \frac{1}{2}\, \beta^2 x^2 + \_C1\, x + \_C2 \tag{20}$$

> $SolYpos := dsolve(subs(\text{alpha} = \text{beta} \cdot \cdot 2, EcuaY))$

$$SolYpos := G(y) = -\frac{1}{8}\, \beta^2 y^2 + \_C1\, y + \_C2 \tag{21}$$

> $SolGralPos := z(x, y) = rhs(SolXpos) + subs(\_C1 = \_C3, \_C2 = \_C4, rhs(SolYpos))$

$$SolGralPos := z(x, y) = \frac{1}{2}\, \beta^2 x^2 + \_C1\, x + \_C2 - \frac{1}{8}\, \beta^2 y^2 + \_C3\, y + \_C4 \tag{22}$$

> $CompSeisBis := eval(subs(z(x, y) = rhs(SolGralPos), Ecua))$

$$CompSeisBis := 0 = 0 \tag{23}$$

> $SolXneg := dsolve(subs(\text{alpha} = -\text{beta} \cdot \cdot 2, EcuaX))$

$$SolXneg := F(x) = -\frac{1}{2}\, \beta^2 x^2 + \_C1\, x + \_C2 \tag{24}$$

> $SolYneg := dsolve(subs(\text{alpha} = -\text{beta} \cdot \cdot 2, EcuaY))$

$$SolYneg := G(y) = \frac{1}{8}\, \beta^2 y^2 + \_C1\, y + \_C2 \tag{25}$$

> $SolGralNeg := z(x, y) = rhs(SolXneg) + subs(\_C1 = \_C3, \_C2 = \_C4, rhs(SolYneg))$

$$SolGralNeg := z(x, y) = -\frac{1}{2}\, \beta^2 x^2 + \_C1\, x + \_C2 + \frac{1}{8}\, \beta^2 y^2 + \_C3\, y + \_C4 \tag{26}$$

> $CompSeisBisBis := eval(subs(z(x, y) = rhs(SolGralNeg), Ecua))$

$$CompSeisBisBis := 0 = 0 \tag{27}$$

> $restart$

> $F := \dfrac{1}{s \cdot (s \cdot \cdot 2 + 1)}$

$$F := \frac{1}{s\,(s^2 + 1)} \tag{28}$$

> $G := \dfrac{1}{s}$

$$G := \frac{1}{s} \tag{29}$$

> $H := \dfrac{1}{(s \cdot \cdot 2 + 1)}$

$$H := \frac{1}{s^2 + 1} \tag{30}$$

> $with(inttrans):$

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

$$g := 1 \tag{31}$$

> $h := invlaplace(H, s, t)$

$$h := \sin(t) \tag{32}$$

> $gTau := subs(t = \mathrm{tau}, g)$

$$gTau := 1 \tag{33}$$

> $hTau := subs(t = t - \mathrm{tau}, h)$

$$hTau := \sin(t - \tau) \tag{34}$$

> $Convolucion := int(gTau \cdot hTau, \mathrm{tau} = 0 ..t)$

$$Convolucion := -\cos(t) + 1 \tag{35}$$

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

$$f := -\cos(t) + 1 \tag{36}$$