

$$\begin{aligned}
& \text{restart} \\
& \text{Ecua} := \text{diff}(z(x, y), x^2) - 6 \cdot \text{diff}(z(x, y), x, y) + 8 \cdot \text{diff}(z(x, y), y^2) = 0 \\
& \quad \text{Ecua} := \frac{\partial^2}{\partial x^2} z(x, y) - 6 \frac{\partial^2}{\partial x \partial y} z(x, y) + 8 \frac{\partial^2}{\partial y^2} z(x, y) = 0 \quad (1) \\
& \text{EcuaCarac} := m^2 - 6 \cdot m + 8 = 0 \\
& \quad \text{EcuaCarac} := m^2 - 6 m + 8 = 0 \quad (2) \\
& \text{Raiz} := \text{solve}(\text{EcuaCarac}) \\
& \quad \text{Raiz} := 4, 2 \quad (3) \\
& \text{SolGral} := z(x, y) = \_F1(y + \text{Raiz}[1] \cdot x) + \_F2(y + \text{Raiz}[2] \cdot x) \\
& \quad \text{SolGral} := z(x, y) = \_F1(4 x + y) + \_F2(2 x + y) \quad (4) \\
& \text{Comprobar} := \text{simplify}(\text{eval}(\text{subs}(z(x, y) = \text{rhs}(\text{SolGral}), \text{Ecua}))) \\
& \quad \text{Comprobar} := 0 = 0 \quad (5) \\
& \text{with}(\text{PDEtools}) : \\
& \text{SolFinal} := \text{pdsolve}(\text{Ecua}) \\
& \quad \text{SolFinal} := z(x, y) = f_1(2 x + y) + f_2(4 x + y) \quad (6) \\
& \text{restart} \\
& \text{EcuaDos} := \text{diff}(z(x, y), y^2) - 6 \cdot \text{diff}(z(x, y), x, y) + 8 \cdot \text{diff}(z(x, y), x) = z(x, y) \\
& \quad \text{EcuaDos} := \frac{\partial^2}{\partial y^2} z(x, y) - 6 \frac{\partial^2}{\partial x \partial y} z(x, y) + 8 \frac{\partial}{\partial x} z(x, y) = z(x, y) \quad (7) \\
& \text{SolGralCero} := z(x, y) = \_C10 \cdot \exp(-y) + \_C20 \cdot \exp(y) \\
& \quad \text{SolGralCero} := z(x, y) = \_C10 e^{-y} + \_C20 e^y \quad (8) \\
& \text{ComprobarCero} := \text{simplify}(\text{eval}(\text{subs}(z(x, y) = \text{rhs}(\text{SolGralCero}), \text{lhs}(\text{EcuaDos}) \\
& \quad - \text{rhs}(\text{EcuaDos}) = 0))) \\
& \quad \text{ComprobarCero} := 0 = 0 \quad (9) \\
& \text{EcuaX} := \text{diff}(F(x), x) - \beta^2 \cdot F(x) = 0 \\
& \quad \text{EcuaX} := \frac{d}{dx} F(x) - \beta^2 F(x) = 0 \quad (10) \\
& \text{SolX} := \text{dsolve}(\text{EcuaX}) \\
& \quad \text{SolX} := F(x) = c_1 e^{\beta^2 x} \quad (11) \\
& \text{EcuaY} := \frac{(\text{diff}(G(y), y^2) - G(y))}{(6 \cdot \text{diff}(G(y), y) - 8 \cdot G(y))} = \beta^2 \\
& \quad \text{EcuaY} := \frac{\frac{d^2}{dy^2} G(y) - G(y)}{6 \frac{d}{dy} G(y) - 8 G(y)} = \beta^2 \quad (12) \\
& \text{SolY} := \text{dsolve}(\text{EcuaY}) \\
& \quad \text{SolY} := G(y) = c_1 e^{(3 \beta^2 + \sqrt{9 \beta^4 - 8 \beta^2 + 1}) y} + c_2 e^{(3 \beta^2 - \sqrt{9 \beta^4 - 8 \beta^2 + 1}) y} \quad (13) \\
& \text{SolGralPos} := z(x, y) = \text{subs}(c_1 = 1, \text{rhs}(\text{SolX})) \cdot (\text{rhs}(\text{SolY}))
\end{aligned}$$

$$SolGralPos := z(x, y) = e^{\beta^2 x} \left( c_1 e^{(3\beta^2 + \sqrt{9\beta^4 - 8\beta^2 + 1})y} + c_2 e^{(3\beta^2 - \sqrt{9\beta^4 - 8\beta^2 + 1})y} \right) \quad (14)$$

$$> ComprobarPos := simplify(eval(subs(z(x, y) = rhs(SolGralPos), lhs(EcuaDos) - rhs(EcuaDos) = 0)))$$

$$ComprobarPos := 0 = 0 \quad (15)$$

$$> EcuaXX := diff(F(x), x) + \beta^2 \cdot F(x) = 0$$

$$EcuaXX := \frac{d}{dx} F(x) + \beta^2 F(x) = 0 \quad (16)$$

$$> SolXX := dsolve(EcuaXX)$$

$$SolXX := F(x) = c_1 e^{-\beta^2 x} \quad (17)$$

$$> EcuaYY := \frac{(diff(G(y), y) - G(y))}{(6 \cdot diff(G(y), y) - 8 \cdot G(y))} = -\beta^2$$

$$EcuaYY := \frac{\frac{d^2}{dy^2} G(y) - G(y)}{6 \frac{d}{dy} G(y) - 8 G(y)} = -\beta^2 \quad (18)$$

$$> SolYY := dsolve(EcuaYY)$$

$$SolYY := G(y) = c_1 e^{(-3\beta^2 + \sqrt{9\beta^4 + 8\beta^2 + 1})y} + c_2 e^{(-3\beta^2 - \sqrt{9\beta^4 + 8\beta^2 + 1})y} \quad (19)$$

$$> SolGralNeg := z(x, y) = subs(c_1 = 1, rhs(SolXX)) \cdot (rhs(SolYY))$$

$$SolGralNeg := z(x, y) = e^{-\beta^2 x} \left( c_1 e^{(-3\beta^2 + \sqrt{9\beta^4 + 8\beta^2 + 1})y} + c_2 e^{(-3\beta^2 - \sqrt{9\beta^4 + 8\beta^2 + 1})y} \right) \quad (20)$$

$$> ComprobarNeg := simplify(eval(subs(z(x, y) = rhs(SolGralNeg), lhs(EcuaDos) - rhs(EcuaDos) = 0)))$$

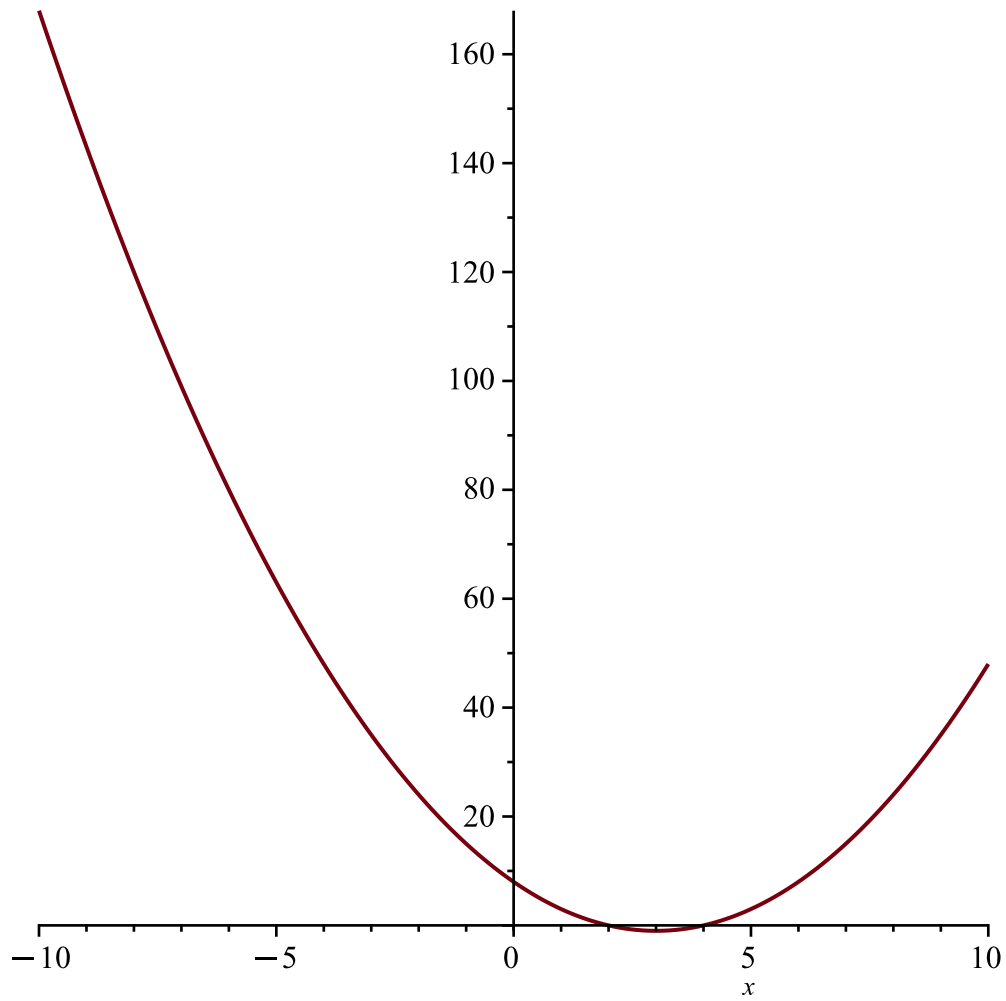
$$ComprobarNeg := 0 = 0 \quad (21)$$

$$> restart$$

$$> f := x^2 - 6 \cdot x + 8$$

$$f := x^2 - 6x + 8 \quad (22)$$

$$> plot(f, x = -10..10)$$



$$> L := 10$$

$$L := 10 \quad (23)$$

$$> a[0] := \frac{1}{L} \cdot \text{int}(f, x = -L..L)$$

$$a_0 := \frac{248}{3} \quad (24)$$

$$> a[n] := \text{subs}\left(\cos(n \cdot \text{Pi}) = (-1)^n, \sin(n \cdot \text{Pi}) = 0, \frac{1}{L} \cdot \text{int}\left(f \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right), x = -L..L\right)\right)$$

$$a_n := \frac{400 (-1)^n}{n^2 \pi^2} \quad (25)$$

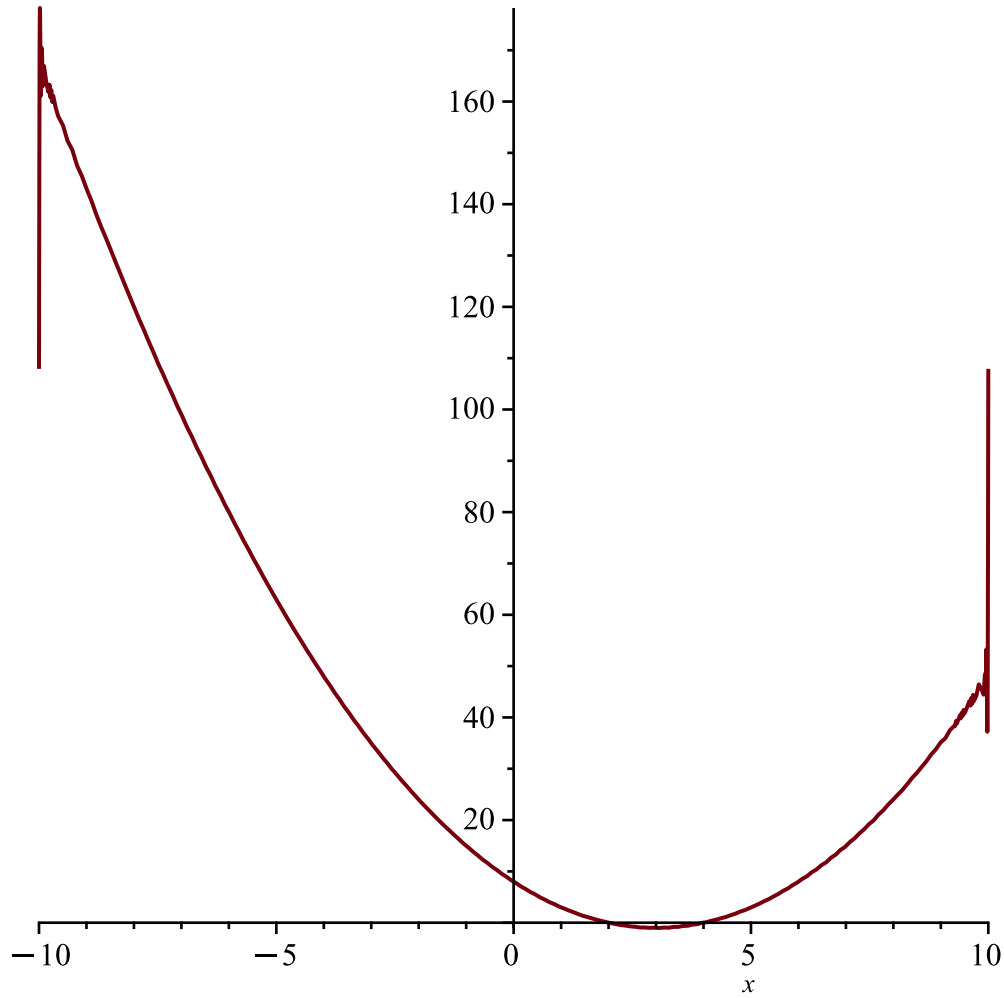
$$> b[n] := \text{subs}\left(\cos(n \cdot \text{Pi}) = (-1)^n, \sin(n \cdot \text{Pi}) = 0, \frac{1}{L} \cdot \text{int}\left(f \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right), x = -L..L\right)\right)$$

$$b_n := \frac{120 (-1)^n}{n \pi} \quad (26)$$

$$> \text{SerieTF} := \frac{a[0]}{2} + \text{Sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right), n = 1..infinity\right)$$

$$SerieTF := \frac{124}{3} + \sum_{n=1}^{\infty} \left( \frac{400 (-1)^n \cos\left(\frac{n \pi x}{10}\right)}{n^2 \pi^2} + \frac{120 (-1)^n \sin\left(\frac{n \pi x}{10}\right)}{n \pi} \right) \quad (27)$$

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> STF500 :=  $\frac{a[0]}{2} + \text{Sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right), n = 1 .. 500\right) :$ 
> plot(STF500, x = -L..L)
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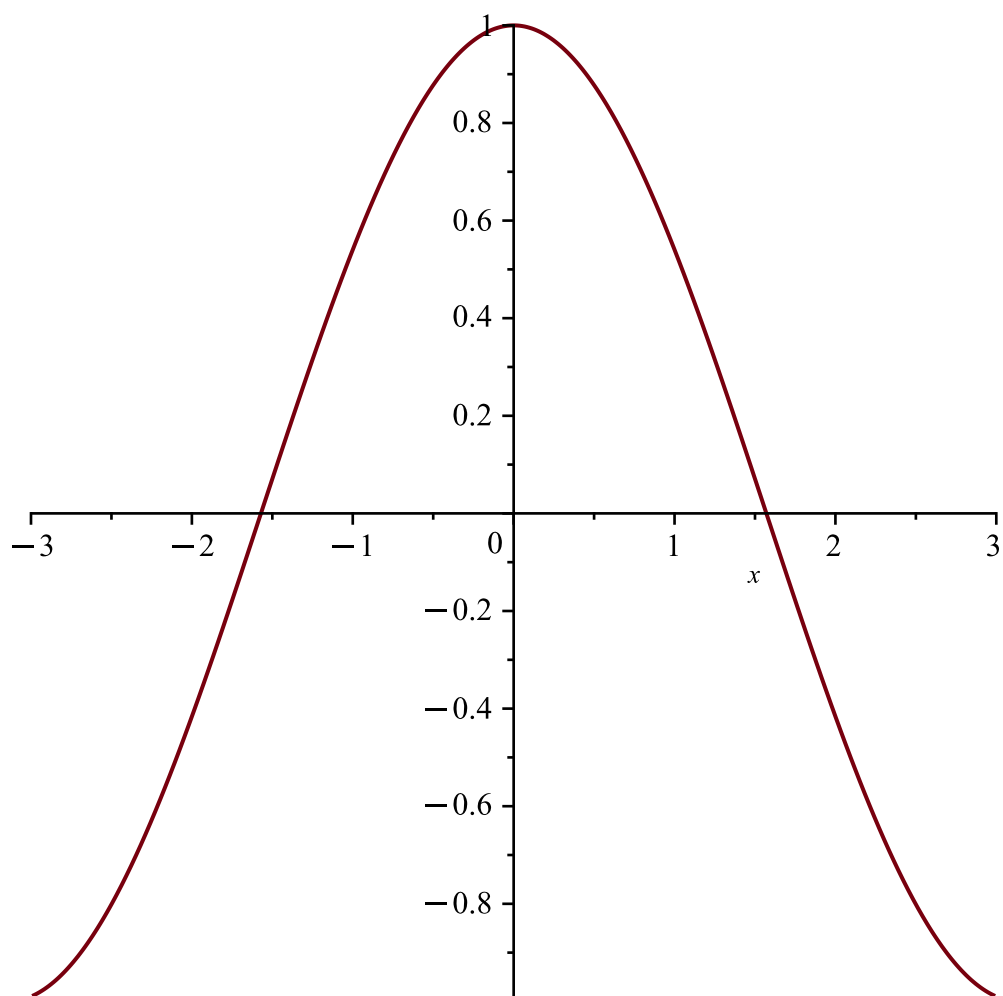


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> g := cos(x)
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$g := \cos(x)$

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> plot(g, x = -3..3)
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(28)



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> h := sin(x)
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$h := \sin(x)$

(29)

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> plot(h, x=-3..3)
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