

> # MANUFACTURED SOLUTION :

> restart :

> $Vr := x \rightarrow \text{sqrt}\left(\frac{2 \cdot \text{var}K}{N\text{mod}}\right) \cdot \text{sum}(\cos(\text{phi}[j] + (K[j, 1] \cdot x + K[j, 2]) \cdot (2 \cdot \text{pi})), j = 1 .. N\text{mod});$

$$Vr := x \mapsto \sqrt{\frac{2 \text{ var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos(\phi_j + 2 (K_{j, 1} x + K_{j, 2}) \pi) \right) \quad (1)$$

> $K := x \rightarrow K\text{Mean} \cdot \exp\left(-\frac{\text{var}K}{2}\right) \cdot \exp(Vr(x));$

$$K := x \mapsto K\text{Mean} e^{-\frac{\text{var}K}{2}} e^{Vr(x)} \quad (2)$$

> $K(x)$

$$K\text{Mean} e^{-\frac{\text{var}K}{2}} e^{\sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos(\phi_j + 2 (K_{j, 1} x + K_{j, 2}) \pi) \right)} \quad (3)$$

>

> $u := (x, y) \rightarrow 3 + \sin(x);$

$$u := (x, y) \mapsto 3 + \sin(x) \quad (4)$$

> $eq := \text{diff}(K(x) \cdot \text{diff}(u(x), x), x);$

$$eq := K\text{Mean} e^{-\frac{\text{var}K}{2}} \sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} -2 K_{j, 1} \pi \sin(\phi_j + 2 (K_{j, 1} x \right. \quad (5)$$

$$+ K_{j, 2}) \pi) \Big) e^{\sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos(\phi_j + 2 (K_{j, 1} x + K_{j, 2}) \pi) \right)} \cos(x)$$

$$- K\text{Mean} e^{-\frac{\text{var}K}{2}} e^{\sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos(\phi_j + 2 (K_{j, 1} x + K_{j, 2}) \pi) \right)} \sin(x)$$

> simplify(%)

$$- \left(2 \left(\sum_{j=1}^{N\text{mod}} K_{j, 1} \sin((2 K_{j, 1} x + 2 K_{j, 2}) \pi + \phi_j) \right) \cos(x) \sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \pi \right. \quad (6)$$

$$+ \sin(x) \Big) K\text{Mean} e^{-\frac{\text{var}K}{2}} e^{\sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos((2 K_{j, 1} x + 2 K_{j, 2}) \pi + \phi_j) \right)}$$

> $f := x \rightarrow eq;$

$$f := x \mapsto eq \quad (7)$$

> $f(x)$

$$K\text{Mean} e^{-\frac{\text{var}K}{2}} \sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} -2 K_{j, 1} \pi \sin(\phi_j + 2 (K_{j, 1} x \right. \quad (8)$$

$$+ K_{j, 2}) \pi) \Big) e^{\sqrt{2} \sqrt{\frac{\text{var}K}{N\text{mod}}} \left(\sum_{j=1}^{N\text{mod}} \cos(\phi_j + 2 (K_{j, 1} x + K_{j, 2}) \pi) \right)} \cos(x)$$

$$-KMean e^{-\frac{varK}{2}} e^{\sqrt{2} \sqrt{\frac{varK}{Nmod}} \left(\sum_{j=1}^{Nmod} \cos(\phi_j + 2 (K_{j,1} x + K_{j,2}) \pi) \right)} \sin(x)$$

> # BOUNDARY CONDITIONS :

$$U(a) = 3 + \sin(a); \quad U(a) = 3 + \sin(a) \quad (9)$$

$$U(b) = 3 + \sin(b); \quad U(b) = 3 + \sin(b) \quad (10)$$

>

$$diff(K(x), x)$$

$$KMean e^{-\frac{varK}{2}} \sqrt{2} \sqrt{\frac{varK}{Nmod}} \left(\sum_{j=1}^{Nmod} -2 K_{j,1} \pi \sin(\phi_j + 2 (K_{j,1} x + K_{j,2}) \pi) \right) e^{\sqrt{2} \sqrt{\frac{varK}{Nmod}} \left(\sum_{j=1}^{Nmod} \cos(\phi_j + 2 (K_{j,1} x + K_{j,2}) \pi) \right)}$$

>

(11)