

Pregunta 1

Correcte

Puntuació
10,00 sobre
10,00

Given the BVP problem, made up by the linear, second order differential equation

$$-\frac{d}{dx} \left((1 + \tan^2(x)) \frac{du}{dx} \right) + 6u = x, \quad x \in (0, \pi/4),$$

and the BC: $u(0) = 1, u(\pi/4) = \alpha$.

Consider its FEM solution using a mesh of $N = 100$ linear elements numbered from left to right in ascending order, in such a way that the first node is placed at $x_1 = 0$, and the last node is placed at $x_{N+1} = \pi/4$. If u_i , $i = 1, \dots, N + 1$, denotes the nodal solution given by the FEM, then:

(a) (4 points) For $\alpha = 2$ the interpolated value of u at $x = 0.388$ is

- ☒ 1.1640e+00 ✓
- ☐ 1.0947e+00
- ☐ Leave it empty (no penalty)
- ☐ 7.2173e-01
- ☐ 9.9005e-01
- ☐ 1.1746e+00

Puntuació 4,00 sobre 4,00

La resposta correcta és: 1.1640e+00

Hint. $u_{15} = 9.6385e-01$ (you can use the Matlab interp1 function)

(b) (3 points) For the same value of α , $\alpha = 2$, the averaged value of the nodal solution, $\langle u \rangle := \frac{\sum_{i=1}^{N+1} u_i}{N+1}$, is

- ☐ 1.3362e+00
- ☐ 1.0115e+00
- ☒ 1.2847e+00 ✓
- ☐ Leave it empty (no penalty)
- ☐ 1.2119e+00
- ☐ 1.7769e+00

Puntuació 3,00 sobre 3,00

La resposta correcta és: 1.2847e+00

(c) (3 points) The value of α that makes the averaged value of u , $\langle u \rangle$ to be 1 is

1.3736e+00



Give the result in format **short e**.

Hint. You can also adjust the α value by computing with different α s until the average is near 1 (for instance 0.9999).

Torna a començar

Desa

Emplena amb les respostes correctes

Envia i acaba

Tanca la previsualització

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