MN-P1-ExParcial-2Q-21-22

1. **Question 1**

CLOZE 1 point 0.10 penalty

Given the differential equation $-\dfrac{\mathrm{d}}{\mathrm{d}x}\left((x+1)\dfrac{\mathrm{d}u}{\mathrm{d}x}\right)+3u=ax$, $0<x<1$, with boundary conditions $u(0)=\alpha$ and $u'(1)=1.0$, use the FEM approach with $N=100$ linear elements of the same length to compute:

(a) For $a=-1$, $\alpha=2.0$, the minimum of the nodal solution $\{U_i\}_{i=1,\ldots,N+1}$

MULTI 1 point Single Shuffle

- 1.3078e+00 ✓
- 1.3517e+00 (−25%)
- 1.2618e+00 (−25%)
- 1.3935e+00 (−25%)
- None of the given the answers (−25%)
- Blank (no penalty)

Hint. For The same value $\alpha=2.0$, but fixing $a=0$, the minimum of the nodal solution is $\min\limits_{i=1,\ldots,N+1} U_i =$ 1.4115e+00.

(b) For $a=-1$ and the same value of α, $\alpha=2.0$, the interpolated value of u at the point $x=0.337$ using the values of u at nodes of the element to which it belongs

MULTI 1 point Single Shuffle

- 1.4126e+00 ✓
- 1.4383e+00 (−25%)
- 1.3870e+00 (−25%)
- 1.4639e+00 (−25%)
- None of the given the answers (−25%)
- Blank (no penalty)

(c) For $a=-1$, the value of α such that the solution at node 27 minus the solution at node 70 twices the solution node 52

MULTI 1 point Single Shuffle

- -1.0392e+00 ✓
- -1.1741e+00 (−25%)
- -9.0436e-01 (−25%)
- -1.3089e+00 (−25%)
- None of the given the answers (−25%)
- Blank (no penalty)