

Pregunta 1

Correcte

Puntuació
10,00 sobre
10,00

Consider the triangular mesh meshMontseny.m that you have available on the [following link](#).
The mesh is from the Montseny Natural Park, with units (the positions of the nodes) in kilometers.
Consider the point $P = (13, 1)$.

- (a) (3 points)** The mean of the x -component of the three nodes of the element containing P is:
- ☐ 1.2834e+01
 - ☐ 1.3063e+01
 - ☐ Empty answer (no penalty)
 - ☐ 1.2737e+01
 - ☒ 1.2961e+01✔

Puntuació 3,00 sobre 3,00

La resposta correcta és: 1.2961e+01

Hint: The mean of the y -component of the three nodes of the element containing P is: 1.0032e+00

- (b) (3 points)** If point Q is the barycenter (which, as you know, is the point inside the triangle with equal barycentric coordinates) of element 4074, the distance between P and Q is:
- ☐ 4.1984e+00
 - ☐ 4.0956e+00
 - ☒ 4.1413e+00✔
 - ☐ 4.1691e+00
 - ☐ Empty answer (no penalty)

Puntuació 3,00 sobre 3,00

La resposta correcta és: 4.1413e+00

- (c) (2 points)** Let us consider the point $R = (10, 2)$.If the temperature at points P , Q , and R is $T(P) = 18.7$, $T(Q) = 17.6$, and $T(R) = 17.2$, what will be the interpolated temperature at point $(11, 2)$?
- ☐ 1.7646e+01
 - ☐ Empty answer (no penalty)
 - ☒ 1.7756e+01✔
 - ☐ 1.7881e+01
 - ☐ 1.7956e+01

Puntuació 2,00 sobre 2,00

La resposta correcta és: 1.7756e+01

- (d) (2 points)** In a book, we saw that the surface of the Natural Park is $S = 310 \text{ km}^2$.
What is the relative error of the area defined by our mesh if we take S as the true value?
- ☐ 2.0921e-03
 - ☐ Empty answer (no penalty)
 - ☐ 2.0741e-03
 - ☐ 2.0424e-03
 - ☒ 2.0836e-03✔

Puntuació 2,00 sobre 2,00

La resposta correcta és: 2.0836e-03

Hint 1: Recall that: $\text{Relative Error} = \frac{|\text{Measured Value} - \text{True Value}|}{|\text{True Value}|}$

Hint 2: Recall that the area of a triangle with vertices (x_1, y_1) , (x_2, y_2) , (x_3, y_3) can be computed as $\frac{1}{2} \det \begin{pmatrix} 1 & x_1 & y_1 \\ 1 & x_2 & y_2 \\ 1 & x_3 & y_3 \end{pmatrix}$.