MÈTODES NUMÈRICS: **Ex-Final 1Q 2018-19 (a)**

Name and surnames:

(4) Consider the domain Ω defined by the mesh file **meshAleta2DQuad.m**. We want to study the thermal problem with two essential BC and two convection BC defined as:

$$\begin{cases} -\dfrac{\partial}{\partial x}\left(k_c\dfrac{\partial T}{\partial x}\right) - \dfrac{\partial}{\partial y}\left(k_c\dfrac{\partial T}{\partial y}\right) = f(x,y), \qquad (x,y)\in\Omega, \\ \\ T(0,y) = 100, \\ T(5,y) = 200, \\ q_n(x,0) = -3(T(x,0)-10), \\ q_n(x,y) = -2(T(x,y)-20), \qquad 0\le x\le 5, \quad 5y-2x-10=0 \end{cases}$$

Take $k_c = 0.7$ and $f(x,y)\equiv 0$ on Ω and compute the solution of the problem obtained by the finite element method.

(a) Compute the minimum temperature achieved at the nodes and the coordinates (x,y) of the node with minimum temperature:

min Temperature =	1.7272e+01

node coordinates =	2	0

(*Hint:* The temperature at node 156 is: 8.4115e+01)

(b) Using the point $p = [2.3, 2.2]$, find the number of the element to which p belongs, its second barycentric coordinate and the interpolated temperature T_p of the point p

Element number =	93
α_2 =	3.7260e-01
T_p =	4.5242e+01

(c) The number of nodes whose temperature differs from T_p by less than 5 degrees.

Number of Nodes:	45

(*Hint:* The number of points for a difference of 2 degrees is: 19) `(2.5 points)`