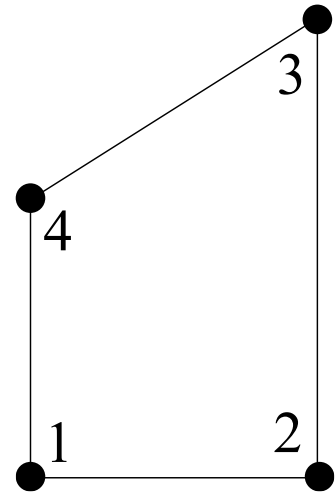## HOMEWORK 5

ASSIGNED: 10/09/25

DUE: 10/16/25 (on ELC, PDF and MATLAB), before class

Using your recently developed shape functions in two dimensions, determine the stiffness matrix and the flux vector due to heat generation (s) for the geometry shown here.

The coordinates for the four corners (numbered as shown!) are given in x,y by:

$$[xy]^e = \begin{bmatrix} 0 & 0 \\ 0.5 & 0 \\ 0.5 & 0.8 \\ 0.0 & 0.5 \end{bmatrix}$$

The equation for the stiffness matrix and the flux vector due to heat generation are given by:

$$[K]^e = \int_\Omega [B]^{e^T} k [B]^e \, d\Omega$$

$$[f]^e_s = \int_\Omega [N]^{e^T} s \, d\Omega$$

The conductivity k is equal to 5, the heat generation s is equal to 10.

Integrate using gauss quadrature. Recall that the integration may be rewritten:

$$\int_\Omega d\Omega = \int_{-1}^{1} \int_{-1}^{1} \det J \, d\xi \, d\eta$$