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The MATLAB code provided here differ on various aspects from the one provided for HW5.

- Because it is written for isoparametric elements, the `NB_element.m` files now contains information related to the shape functions for the canonical element. The output of these functions has been modified as well.

- The data structure `bdry` containing information about the boundaries of the domain is now a cell array. Cell arrays allow to store matrices of (potentially) different size in the same structure. For the boundary k of the domain, the kth row of the cell array `bdry{k,:}` contains:

  - `bdry{k,1}`: column vector of the corresponding boundary nodes
  - `bdry{k,2}`: column vector of the corresponding physical boundary elements
  - `bdry{k,3}`: column vector of the boundary face numbers of the corresponging element in `bdry{k,1}`

For the mesh comprised of the two 3-node triangular elements schematized on Figure 1 below, the `nodes` and `elements` arrays are for example

$$\text{nodes} = \begin{pmatrix} 0 & 0 \\ 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{pmatrix}, \quad \text{elements} = \begin{pmatrix} 1 & 2 & 4 \\ 2 & 3 & 4 \end{pmatrix}. \tag{1}$$
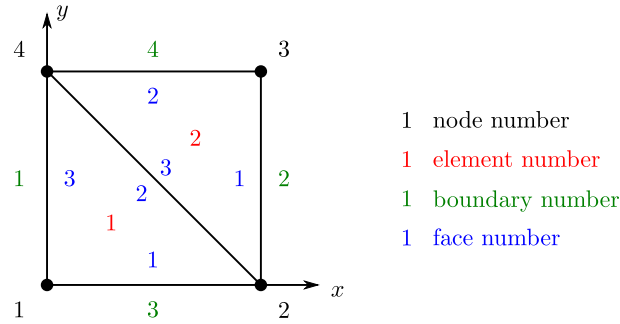

Figure 1: Mesh

Since the numbering of the faces follows the node numbering in the canonical element, the entries of

the bdry cell array are

$$\text{bdry}\{1,1\} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}, \ \text{bdry}\{1,2\} = \begin{pmatrix} 1 \end{pmatrix}, \ \text{bdry}\{1,3\} = \begin{pmatrix} 3 \end{pmatrix}$$

$$\text{bdry}\{2,1\} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}, \ \text{bdry}\{2,2\} = \begin{pmatrix} 2 \end{pmatrix}, \ \text{bdry}\{1,3\} = \begin{pmatrix} 1 \end{pmatrix}$$

$$\text{bdry}\{3,1\} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \ \text{bdry}\{1,2\} = \begin{pmatrix} 1 \end{pmatrix}, \ \text{bdry}\{1,3\} = \begin{pmatrix} 1 \end{pmatrix}$$

$$\text{bdry}\{4,1\} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}, \ \text{bdry}\{2,2\} = \begin{pmatrix} 2 \end{pmatrix}, \ \text{bdry}\{1,3\} = \begin{pmatrix} 2 \end{pmatrix}. \tag{2}$$