"Connectivity Matrix"

* Required for 2D or 3D elements
* Tells which (global) nodes are in each element.

Connectivity matrix = nele x nnpe
nele = # of elements
nnpe = # of nodes per element

E.g., Linear triangular
nnpe = 3
Quad triangle
nnpe = 6

When we build a geometric model, number all the nodes globally, then, create the connectivity matrix to say which nodes correspond to local nodes 1, 2, 3, 4, 5, 6.

Example:

[Diagram showing connectivity matrix with nodes 1, 2, 3, 4, 5, 6, and labels for x and y axes.]
Each element has local node numbering scheme

Connectivity matrix: mapping between local node #5 and the global #5

<table>
<thead>
<tr>
<th>Elements</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

So what?

We derived the conductivity matrix $K_c$ for a B linear triangles

$[K_c] = [k_e B^T B] = 3 \times 3$ matrix

For each element compute $[K_c]$

Assemble global coefficient matrix $A$
for ele = 1: nEle

    Kc = - What it is

    for row = 1:3
        for col = 1:3
            A(connect(ele, row), connect(ele, col)) =
            A(connect(ele, row), connect(ele, col)) + Kc(row, col)
        end
    end
end

Always use connect matrix to relate local "degrees of freedom" to global ones. Circs, etc.

Located at KcLinearTriangle.m
TwoDLinTri.m
TestTwoD.m