PROJECT 2

Assigned 10/16/25

Due 10/30/25, end of day (11:59 PM).

Overview:

For this project you are responsible for predicting the distribution of temperatures within a discretization of your selected 2-D area.

Components:

- 2-D Shape Functions
- Global and Local Coordinate Systems and Conversions

Overall Tasks:

- Discretize your selected geometry into at least three elements. Clearly label the element numbers, global node numbers, and local node numbers. Select nodes for a fixed boundary condition (must be greater than 0 K) and select a surface for heat flux. Solve for the temperatures at the unfixed nodes.
- Using a modified APDL script, compare your results for nodal temperatures
- Submit an electronic copy of any MATLAB scripts used to calculate the nodal temperatures along with scanned or photographed images from any hand-calculations.
    - Please submit the entire project in a zip folder.

Deliverables:

Upload the following files to ELC

- PDF file containing the following items:
    - Clearly defined geometry and conditions. This includes:
        - All nodal and elemental numbering schemes.
        - Selected boundary conditions (location and values)
        - Conductivity (k)
    - Results:
        - Nodal temperatures (both MATLAB and APDL)
- Original MATLAB scripts used to produce the results.
- APDL script (.txt) used for comparison.

6350 Assignment:

- Generate a vector plot of the heat flux within the elements. To do this, post-process the nodal temperatures in each element into the flux as shown below. To plot the results, you may use the **quiver** command in MATLAB.

$$[q] = -k[\nabla\theta] = -k[B]^e[d]^e$$

Grading:

Goal	Points
MATLAB script exactly matches APDL predictions for nodal temperatures using four node elements.	**--/70**
Temperature post-processed into a contour map within MATLAB using post-processing.	**--/15**
MATLAB script supports 9 node elements. Additional numbering schemes must be provided for this case.	**--/15**