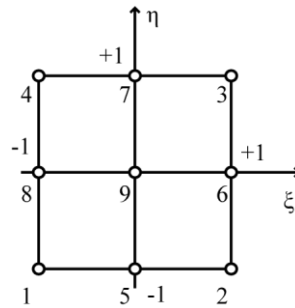


MAE 404/598 Finite Elements in Engineering

Programming assignment #6

Write a function to compute the shape functions and their derivatives with respect to the parent coordinates of the 9-node quadrilateral element shown below.



The element is a bi-unit square (i.e. the coordinates of the sides are located at ± 1).

Instructions for programming and assignment submission:

- For this assignment, submit only a single MATLAB code named “**asurite_hw6.m**”.
- The file **must** define a function of the same name as the file name (but without the “.m”) , e.g.

```
function [N, dNdp] = asurite_hw6(p)
    % Compute external forces here.
end
```

- **Input arguments:** p: a 2x1 array of parent coordinates $p = [\xi; \eta]$.
- **Output arguments:** N: a 9x1 array containing the shape functions; dNdp: a 9x2 array containing the derivatives of the shape functions with respect to the parent coordinates.

$$N = \begin{bmatrix} N_1 \\ N_2 \\ \vdots \\ N_9 \end{bmatrix} \quad dNdp = \begin{bmatrix} \frac{\partial N_1}{\partial \xi} & \frac{\partial N_1}{\partial \eta} \\ \frac{\partial N_2}{\partial \xi} & \frac{\partial N_2}{\partial \eta} \\ \vdots & \vdots \\ \frac{\partial N_9}{\partial \xi} & \frac{\partial N_9}{\partial \eta} \end{bmatrix}$$

Your submission will be graded electronically. Failure to comply with the above instructions may result in zero credit.

Submit your assignment to <http://sparky.fulton.asu.edu/fe/>

Can be resubmitted daily until Tuesday March 22 at 12 midnight.