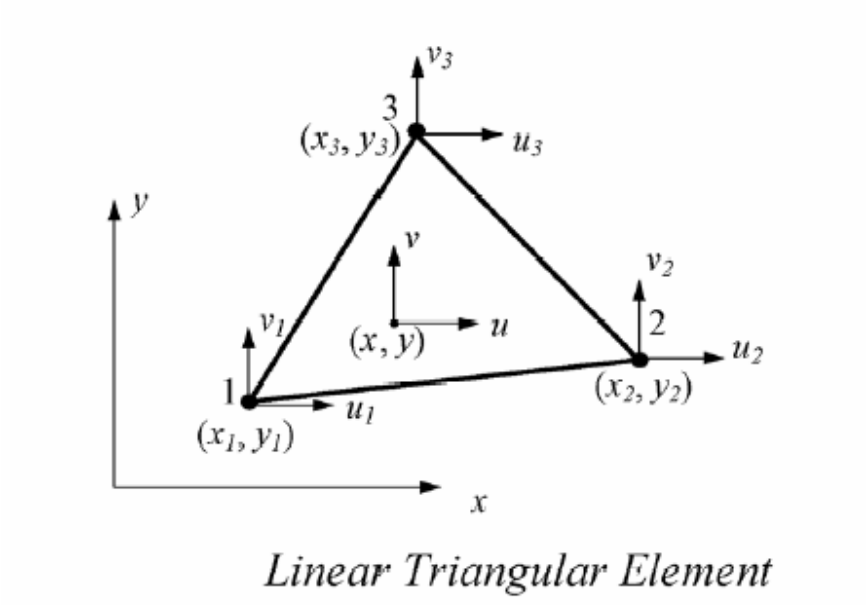
MENG 412
Homework Assignment 6
Due Tuesday: 23/6/1425 H

Q1. Prove that the area of the triangular element is *A* where:

$$2A = x_{13}y_{23} - x_{23}y_{13}$$

and note that:

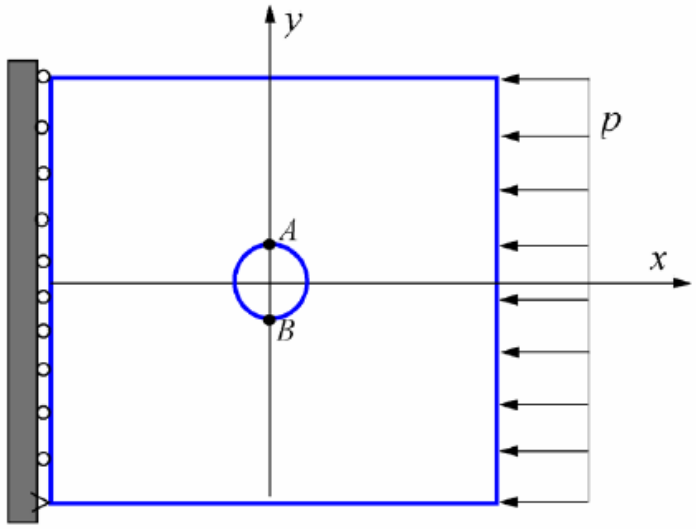
$$x_{ij} = x_i - x_j \text{ and } y_{ij} = y_i - y_j \ (i, j = 1, 2, 3)$$



Linear Triangular Element

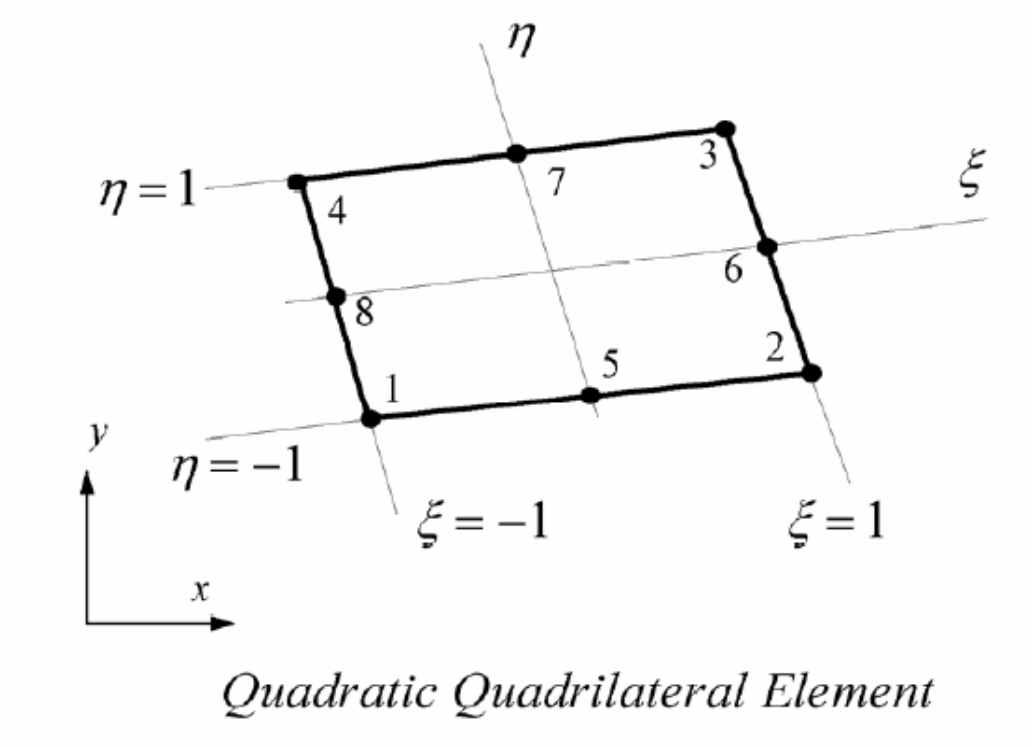
Q2.

A square plate with a hole at the center and under pressure in one direction.



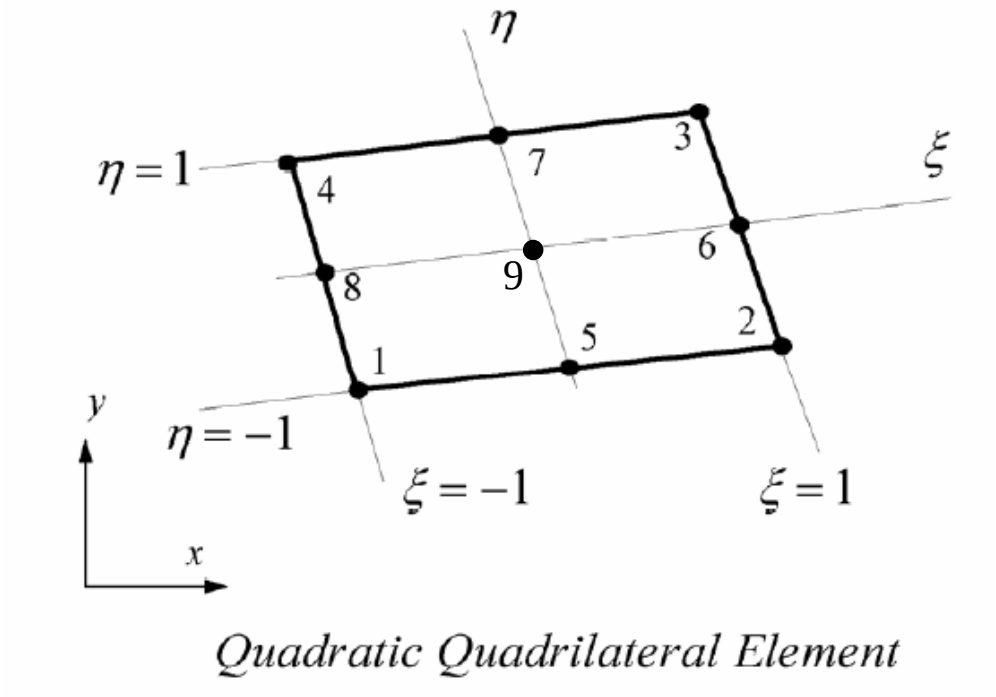
The dimension of the plate is 10 in. x 10 in., thickness is 0.1 in. and radius of the hole is 1 in. Assume $E = 10 \times 10^6$ psi, $v = 0.3$ and $p = 100$ psi. Find the maximum stress in the plate.

Q3. Find the shape functions of the Quadratic Quadrilateral Element with 8 nodes using the **inspection method.**



Quadratic Quadrilateral Element

Q4. Find the shape functions of the Quadratic Quadrilateral Element with 9 nodes using the **inspection method.**



Quadratic Quadrilateral Element