National Taiwan University **Finite Element Method**

Department of Civil Engineering Instructor: C.-S. CHEN

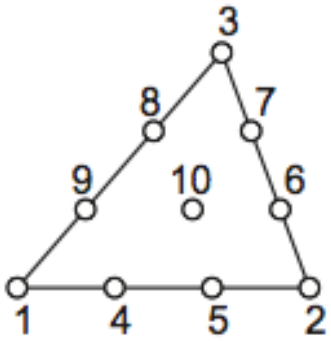
Homework 11, 06/05/2019 Due: 06/12/2019

A4 professional format and you should document your codes, collecting at the BEGINNING of class (09:09 am)

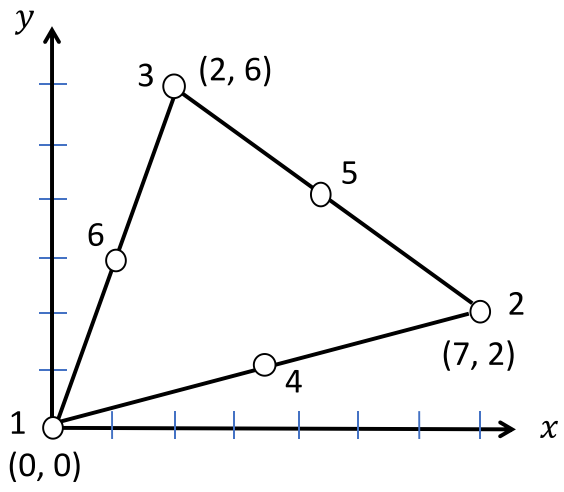
(late submission within 24 hours: score*0.9; late submission before post of solution: score*0.8 (the solution will be posted usually within a week))

Total 80% + 40% (Bonus)

1. **(40%)** Consider a cubic triangular element shown below. Find the shape functions in the triangular coordinates for the nodes 3, 8, 9, 10 and plot these shape functions in MATLAB.



2. **(40%)** Consider the quadratic triangle element shown below. Calculate the Jacobian matrix using T3 shape functions (subparametric formulation) and calculate $\frac{\partial N_4}{\partial x}$ and $\frac{\partial N_4}{\partial y}$ at the point $(2,\ 4)$.



3. **(Bonus 40%)** Consider the quadratic triangle element shown in Problem 2. Calculate the Jacobian matrix using a T6 (isoparametric formulation) and calculate $\frac{\partial N_1}{\partial x}$, $\frac{\partial N_1}{\partial y}$, $\frac{\partial N_4}{\partial x}$ and $\frac{\partial N_4}{\partial y}$ at the point $(2,\ 4)$.