ES128: Homework 1
Due in class on Wednesday, 17 February 2010

Problem 1

For the spring system given in Figure 1,

a. Number the elements and nodes;
b. Assemble the global stiffness and force matrix;
c. Partition the system and solve for the nodal displacements;
d. Compute the reaction forces.

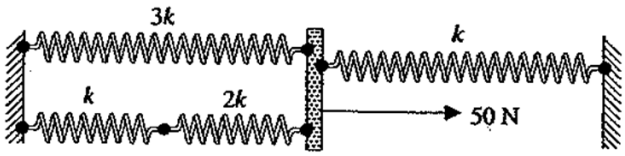

Figure 1

Problem 2

Figure 2 shows a two-member plane truss supported by a linearly elastic spring. The truss members are of a solid circular cross section having d=20 mm and E=80Gpa. The linear spring has stiffness constant 50 N/mm.

a. Assemble the system global stiffness matrix and calculate the global displacements of the unconstrained node;
b. Compute the reaction forces and check the equilibrium conditions;
c. Check the energy balance. Is the strain energy in balance with the mechanical work of the applied force?
d. Compute the strain and stress in each bar.

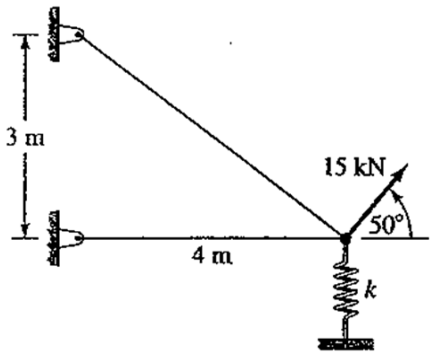

Figure 2