Homework 3
(100 Points) **Due: Oct. 20 at 3:30pm**

Please submit your Abaqus model and result files (.cae, .rpt,.odb), **and your answer report** for all problems summarizing results with discussions.

Problem 1 (40 Points)

Complete the workshop example separately. Answer all questions in the end of the workshop in your report. In addition, perform the parametric studies in Abaqus below:

a. Change the density to $\rho = 15600kg/m^3$, and Poisson's ratio to $\upsilon = 0.5$.

b. Change the Young's Modulus to $E = 400GPa$.

c. Change the external load to $P = 20KN$.

d. Change the Young's Modulus to $E = 400GPa$, and the external load to $P = 20KN$.

For all the above cases, output the stresses and strains for each truss element. Compare them to the original case and **justify your understanding of results**.

Use Abaqus to solve the problems below. Output the displacements and reactions at each node, and stresses and strains in each element. Summarize those results in your report, discuss and justify your results using physical principles and engineering common sense (force balances, etc.)

Problem 2 (30 Points)

Consider the truss structure given in Figure 2.18. Nodes A and B are fixed. A force equal to 10 N acts in the positive x-direction at node C. Coordinates of joints are given in meters. Young's modulus is $E = 10^{11}$Pa and the cross-sectional area for all bars are $A = 2 \cdot 10^{-2}m^2$.

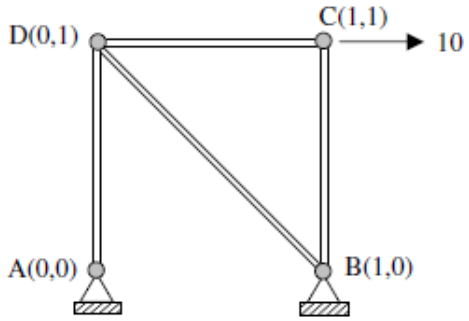

Figure 2.18

Problem 3 (30 Points)

Given the three-bar structure subjected to the prescribed load at point B equal to 10^3 N as shown in Figure 2.19. The Young's modulus is $E = 10^{11}$ Pa, the cross-sectional area of the bar BC is 2×10^{-2} m^2 and that of BD and BF is 10^{-2} m^2 . Note that point D is free to move in the x-direction. Coordinates of joints are given in meters.

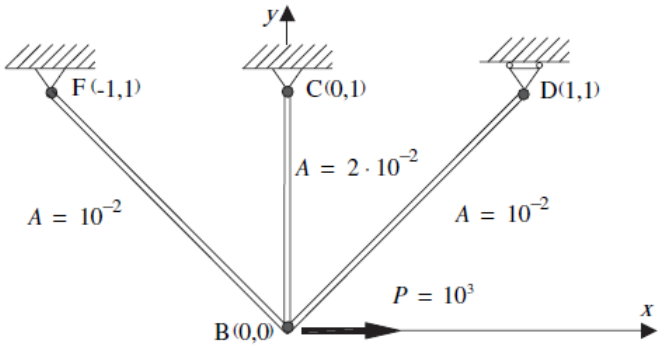

Figure 2.19