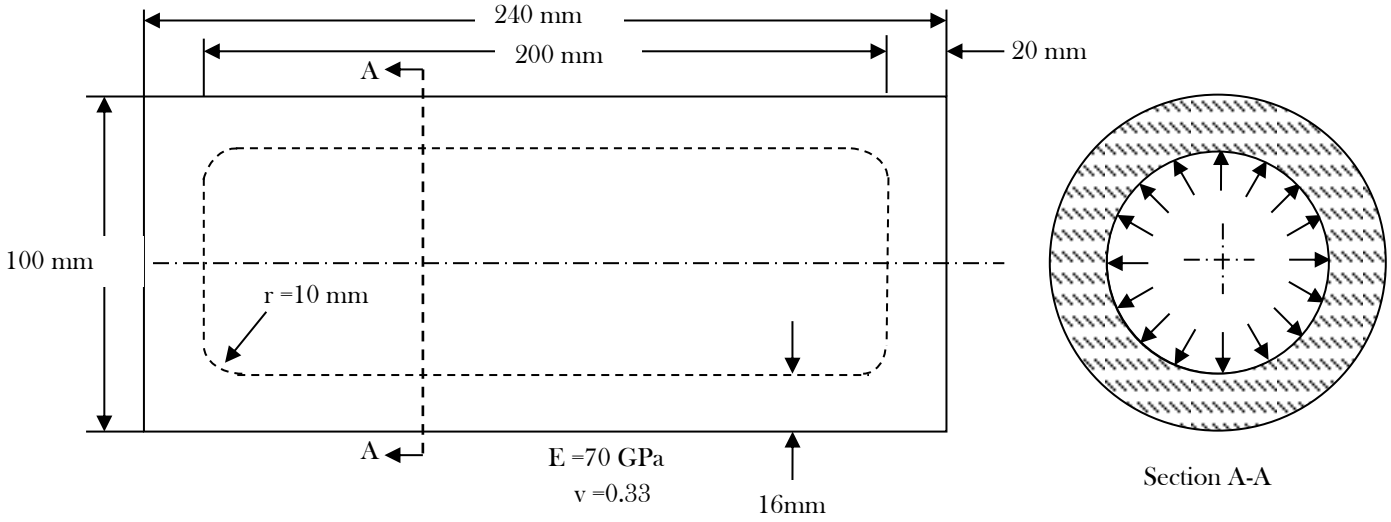
Due Date: December 3, 2015

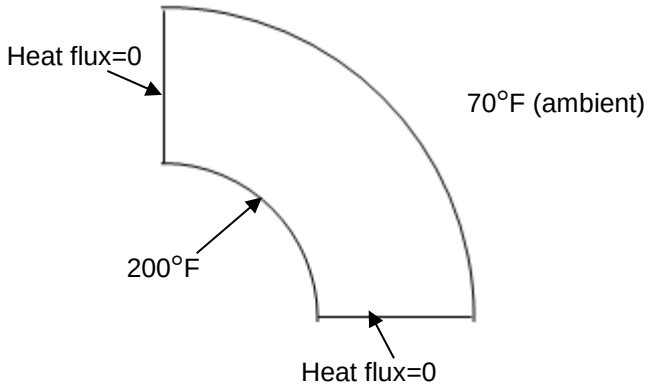
COMPUTER PROJECT
ME/AE 5212 Introduction to Finite Element Analysis

Solve the following three problems using ANSYS.

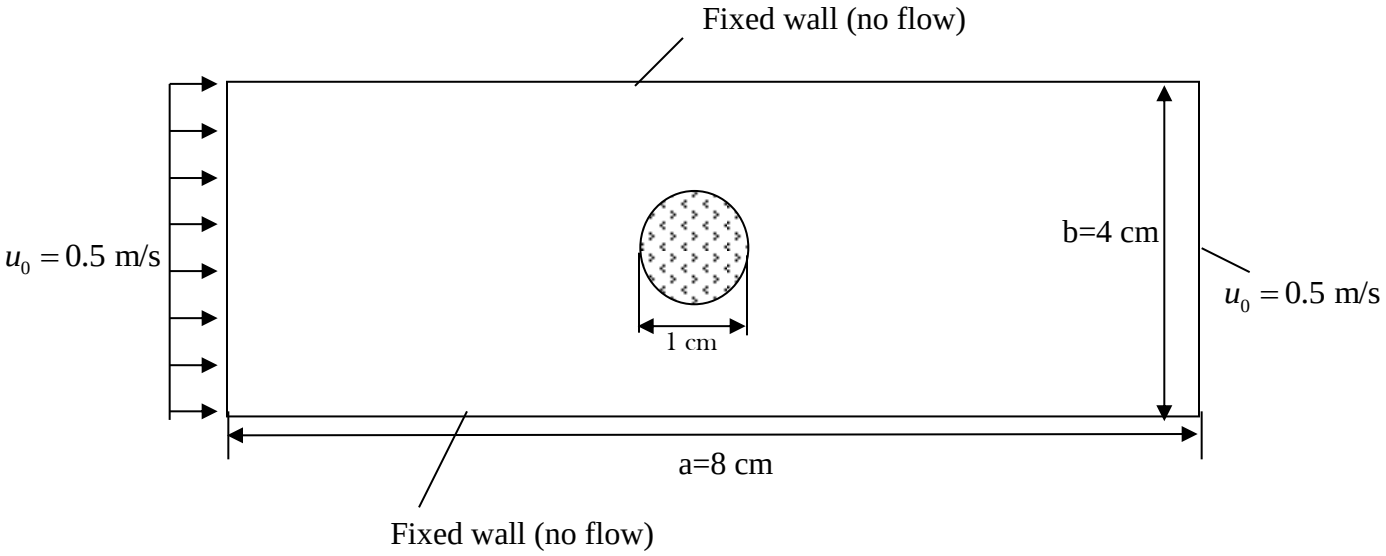
1. Consider the cylindrical closed vessel under uniform internal pressure. Find the maximum pressure it can withstand. Plot the deformed configuration and von-Mises stress distribution in the walls of the closed cylinder. Use a factor of safety of 2 and yield strength for aluminum as 95 MPa. Use 8-node quadratic axisymmetric element (Solid Quad 8 node 183).



2. Consider a long steel cylinder with inner radius 5 in. and outer radius 10 in. The interior of the cylinder is kept at 200°F, and heat is lost on the exterior by convection to a fluid whose temperature is 70°F. The convection coefficient is 5×10^{-4} BTU/sec-in^2-°F and the thermal conductivity for steel is taken to be 8.09×10^{-4} BTU/sec-in-°F. Recognizing the symmetry of the problem, a quarter of a section through the cylinder is modeled. Use 4-node quadrilateral element (Quad 4 node 55). Find the minimum temperature on the exterior surface. Plot the contour plot of temperature distribution.



3. Solve the problem of the flow around a solid cylinder at the center of the plate. The geometry and boundary conditions are shown in the figure. Use triangular element. Find the maximum velocity and maximum pressure. Plot the contour of velocity distribution and pressure distribution. Use air as the fluid material flowing through the plate. Refer to the fluid mechanics problem in ANSYS handout.



The report should include the following:

1. Cover page (title, name, etc.)
2. Statement of the problem/relevant equations
3. Summary and discussion of results
4. Listing of the sample output
5. Limit the pages to 20