

Module I:

1. Find two industrial applications each of (a) steady, and (b) unsteady three-dimensional fluid flow and identify what fluid-flow related engineering information is required in each case.
2. Find two industrial applications where you think that application of CFD techniques would be very useful and two more in which you think that CFD would not be able to contribute much.
3. Do the example problem from Lecture 2 by hand for a 6 x 4 grid (giving you 8 interior nodes at which the velocity has to be evaluated).
4. Write a computer program to evaluate the average velocity for a given pressure gradient in a rectangular duct and see if you can reproduce results of the kind discussed in Lecture 2.
5. Use the method discussed in Lecture 2 to determine the steady state temperature distribution in a rectangular slab of dimensions of 2 m x 1 m in which the left, top, right and bottom sides are at fixed temperatures of 300, 350, 400 and 500 K, respectively. The equation which needs to be solved is $\nabla^2 T = 0$. Can you evaluate the heat transferred through each side. Take thermal conductivity of the plate to be 0.6 W/mK.