

Homework 3: AE601, Computational Fluid Mechanics

Feb. 18 2009

Due: Feb. 25, 2009 (beginning of class)

This homework need not be in the “Computer Homework” format.

Problem 1.

Consider a uniform grid with five grid points:

- by hand, discretize the convection-diffusion equation, i.e. Eq. (3.61) in the textbook, for grid point i .
- use a first order forward finite-difference scheme for the convective term, and a second order central finite-difference scheme for the diffusion term.
- With $\phi(x)$ at grid point 1 and 5 specified as $\phi(x_1) = 1$ and $\phi(x_5)=2$ write down the full system of equations for the five grid points.

What do you expect the convergence rate of the solution to be? Explain your answer.