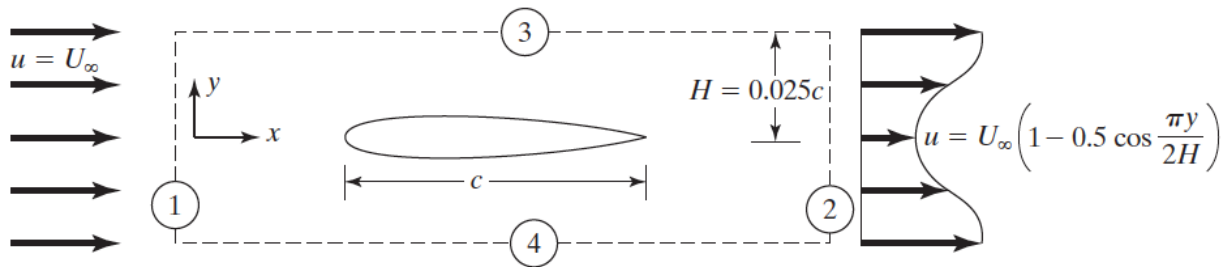


AE 333/707: Tutorial 3.1

Answers without detailed explanation/justification of steps will be heavily penalized.

1. Velocity profiles are measured at the upstream end (surface 1) and at the downstream end (surface 2) of the rectangular control volume shown in the figure below. Surfaces 3 and 4 are at the freestream condition. The pressure is p_∞ (a constant) over the entire surface of the control volume. If the flow is incompressible, two dimensional, and steady, what is the sectional drag coefficient of the airfoil? The vertical dimension H (the half-width of the wake) is $0.025c$, where c is the chord length of the airfoil. You must use the rectangular control volume shown, and not one of your own choice.



2. Refer to the notes, where you will find that adiabatic flows (i.e., $h_0 = \text{constant}$) and isentropic flows (i.e., $s = \text{constant}$) have the same set of assumptions. As we know from basic thermodynamics, isentropic and adiabatic conditions mean different things (what's the difference). Then how are they signifying the same condition here?