Show all reasoning and intermediate results leading to your answer, or credit will be lost. One book of mathematical tables, such as Schaum’s Mathematical Handbook, may be used, as well as a calculator and one handwritten standard size formula sheet.

1. Give the complex velocity potential of ideal flow past a 120 degree internal corner. Also give the pressure on the wall along the positive $x$-axis, assuming that the strength of the flow is increasing in time in an arbitrary manner.

2. A two-dimensional ideal flow consists of a source of strength $m$ a distance $h$ above an infinite flat steel plate. At large distances from the source, and everywhere below the steel plate, the pressure is constant at $p_{\infty}$. Find the complex velocity at all $z$ and the pressure force on the plate. The density is $\rho$.

3. Derive the Blasius solution for the boundary layer along a semi-infinite flat plate from the full two-dimensional system of unsteady boundary layer equations. Assume only that the velocity profile of the velocity component in the direction of the plate is similar, and that the potential flow above the boundary layer is $F = Uz$. Clearly state/show the reasons for each result in your derivation.