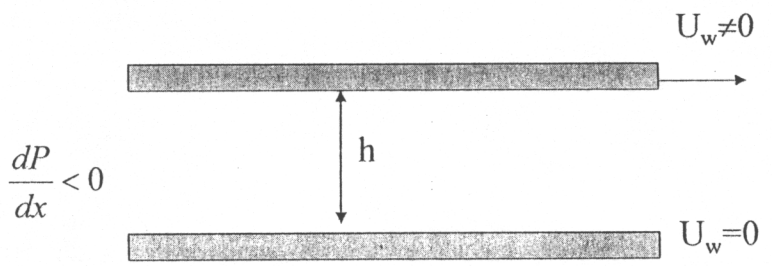
1. Please answer the following questions. (25 points)
   (a) What is potential flow? (5 points)
   (b) Show the governing equations for a 2-D, incompressible potential flow in Cartesian coordinates? (10 points)
   (c) Explain how you can apply potential flow theory on aerodynamics supposing that there exists friction force on airfoil surfaces. (10 points)

2. For an uniform flow over a circular cylinder, please answer the following questions based on potential flow theory. (25 points)
   (a) Determine complex potential of the flow field, F(z). (10 points)
   (b) Write down boundary conditions. (5 points)
   (c) Determine velocity potential and stream function. (5 points)
   (d) Determine velocity distribution, Vr, and Vθ. (5 points)

3. Consider a "general Couett flow" with a moving wall and a constant pressure gradient (Fig. 1). Please answer the following questions. (25 points)
(a) velocity distribution (10 pointS)
(b) shear stress distribution (5 points)
(c) where velocity is the maximum. (5 points)



4. Explain why "ideal flow " and "potential flow" have the same governing equation, i.e. Euler's equation. (10 points)

5. Please show the boundary layer thickness for "stagnation point flow". Also explain why it has such a different trend from " flow over a flat plat". (15 points)