1. Plate glass casting

   High-quality plate glass is cast with extremely flat surfaces by floating it on molten tin and letting it cool as the glass and tin flow down a gently inclined plane.

   Data:

   - Liquid glass entering the process: $\rho = 3.2 \frac{\text{g}}{\text{cm}^3}$, $\mu = 1.0 \frac{\text{N}\cdot\text{s}}{\text{m}^2}$, layer thickness=1mm.
   - Liquid tin: $\rho = 7.0 \frac{\text{g}}{\text{cm}^3}$, $\mu = 3 \times 10^{-3} \frac{\text{N}\cdot\text{s}}{\text{m}^2}$, layer thickness=1mm.
   - Inclined plane angle: 2°.

   (a) Write the general solution to the equation for momentum conservation down the inclined plane in the flow direction.

   (b) What is the interface boundary condition at the glass-tin interface?

   (c) Calculate the velocity distribution in both the glass and the tin. (Hint: measure distance in the tin from the bottom, and distance in the glass from the top surface.)

   (d) What are the maximum and average velocities in the glass and tin?

   (e) Comment on the Reynolds numbers in the glass and tin. Do you think flow will remain laminar in both layers?