Flows with Friction

1. A block slides down an inclined plane on an oil film 0.1 mm thick. The block is 20 cm long, 15 cm wide, and has a mass of 0.35 kg. What is its terminal velocity?

2. Water flows in a parallel plate channel at the rate of $\dot{q} = 0.15 m^3/s$. The channel is 12 cm high and 50 cm wide.
   a) What is the average velocity?
   b) What is the centerline velocity?
   c) What is the pressure gradient?
   d) What is the wall shear stress?

3. A fluid flows in a 1 cm diameter pipe at the rate of 4 m/s. Calculate the Reynolds number and determine if the flow is laminar or turbulent for
a) Air
b) Water
c) Oil