1. *DERIVE EQUATION 6-15*
2. *DERIVE EQUATION 6-48 AND 6-54*
3. *SOLVE ALL PROBLEMS SHOWN BELOW:*

6-7. Water at 20°C flows through a smooth pipe of diameter 3 cm at 30 m^3/h. Assuming developed flow, estimate (*a*) the wall shear stress (in Pa), (*b*) the pressure drop (in Pa/m), and (*c*) the centerline velocity in the pipe. What is the maximum flow rate for which the flow would be laminar? What flow rate would give $\tau_w = 100$ Pa?

6-9. Consider fully developed turbulent flow through a duct of square cross section. Taking advantage of the double symmetry, analyze this problem using the log-law, Eq. (6-38*a*), plus a suitable assumption about variation of shear stress around the cross section. Compare your result for Λ with the hydraulic-radius concept.