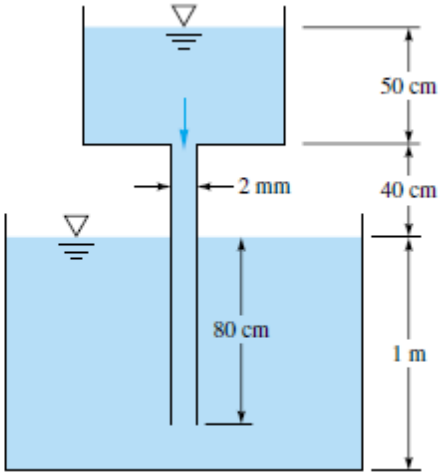
Birzeit University
Mechanical & Mechatronics Engineering Department
Thermal fluid engineering ENMC4411
Homework 4
Chapter 4 Viscous pipe flow

Instructors: Dr. Afif Akel

Problem 1 (P. 6. 33)

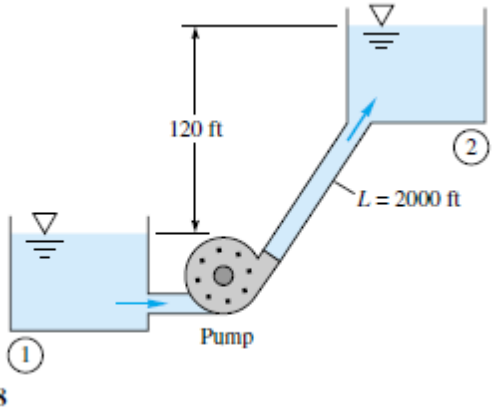
For the configuration shown in Fig. P6.33, the fluid is ethyl alcohol at 20°C, and the tanks are very wide. Find the flow rate which occurs in m3/h. Is the flow laminar?



P6.33

Problem 2 (P6.68)

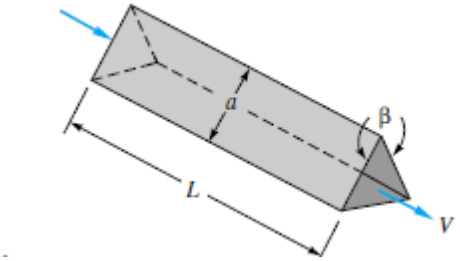
Water at 20°C is to be pumped through 2000 ft of pipe from reservoir 1 to 2 at a rate of 3 ft3/s, as shown in Fig. P6.68. If the pipe is cast iron of diameter 6 in and the pump is 75 percent efficient, what horsepower pump is needed?



P6.68

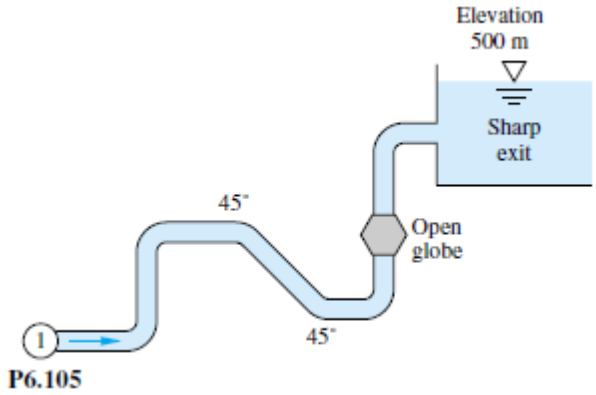
Problem 3 (P6.91)

Heat exchangers often consist of many triangular passages. Typical is Fig. P6.91, with L = 60 cm and an isosceles-triangle cross section of side length a = 2 cm and included angle $\beta = 80°$. If the average velocity is V = 2 m/s and the fluid is SAE 10 oil at 20°C, estimate the pressure drop.



Problem 4 (P6.105)

The system in Fig. P6.105 consists of 1200 m of 5 cm cast-iron-pipe, two 45° and four 90° flanged long-radius elbows, a fully open flanged globe valve, and a sharp exit into a reservoir. If the elevation at point 1 is 400 m, what gage pressure is required at point 1 to deliver 0.005 m3/s of water at 20°C into the reservoir?



P6.105