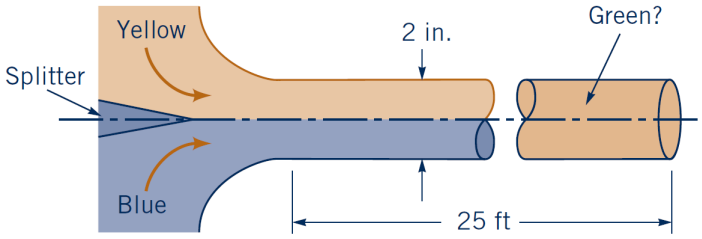
Homework set 11
Due: 2:10 PM – November 16, 2018

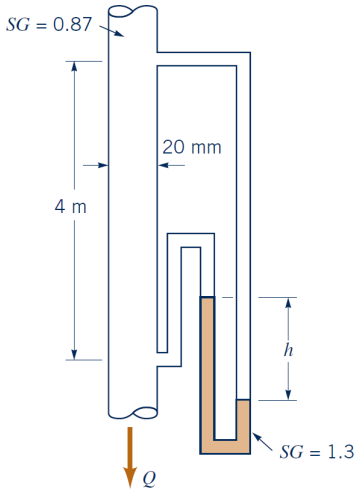
Problem 1

Blue and yellow streams of paint at 60^o F (each with a density of 1.6 $slugs/ft^3$ and a viscosity 1000 times greater than water) enter a pipe with an average velocity of 4 ft/s as shown in the figure. Would you expect the paint to exit the pipe as green paint or separate streams of blue and yellow paint? Explain. Repeat the problem if the paint were "thinned" so that it is only 10 times more viscous than water. Assume the density remains the same.



Problem 2

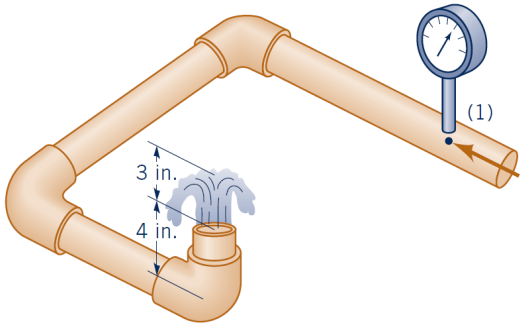
Oil of SG=0.87 and a kinematic viscosity $\nu = 2.2 \times 10^{-4}\ m^2/s$ flows through the vertical pipe shown in the figure at a rate of $4 \times 10^{-4}\ m^3/s$. Determine the manometer reading, h.



Problem 3

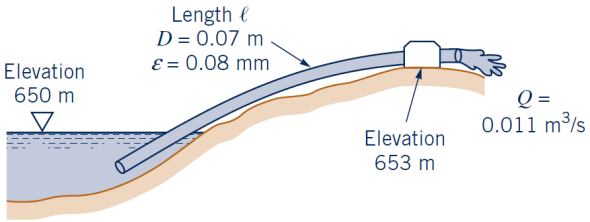
As shown in the figure below, water "bubbles up" 3 in. above the exit of the vertical pipe attached to three horizontal pipe segments. The total length of the 0.75-in.-diameter

galvanized iron pipe between point (1) and the exit is 21 in. Determine the pressure needed at point (1) to produce this flow.



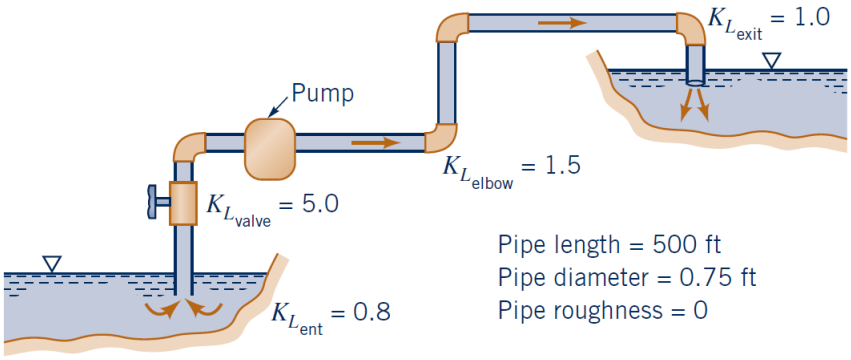
Problem 4

Water at 10^o C is pumped from a lake as shown in the figure. If the flowrate is 0.011 m^3/s, what is the maximum length inlet pipe, l, that can be used without cavitation occurring? (Note: $P_{cav} = 1.228$ kPa)



Problem 5

The pump shown in the figure delivers a head of 250 ft to the water. Determine the power that the pump adds to the water. The difference in elevation of the two ponds is 200 ft.



TEXTBOOK

Munson, B.R., Okiishi, T.H., Huebsch, W.W., and Rothmayer, A.P., "Fundamentals of Fluid Mechanics", 7th Edition, 2013, John Wiley & Sons.