Name: …… Class: ……... TLU ID #: ……..…..

Chapter 8: Viscous Flow in Pipes

Homework Assignment #7

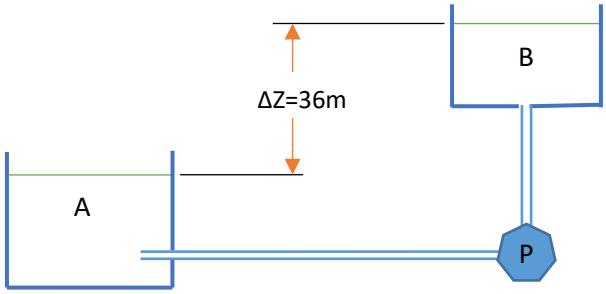
Due on Thursday, May 02, 2024

Students do the following problems from your textbook: **8.20, 8.22, 8.30, 8.62, 8.91;**

Please also do the following problems:

1. Water flows by gravity through a smooth pipe from one reservoir to a lower one. The elevation difference is 100 m. The pipe lengh is 4500 m, with a diameter of 4 cm. If we neglect minor losses**, calculate the expected flow rate in m^3/s**. The kinematic viscosity of water is $\upsilon = 1.01\times10^{-6}\ m^2/s$.

2. Water is pumped through 650 m of pipe from reservoir A to reservoir B at a flow rate of 80 *l/s*, shown in the figure. If the pipe is cast iron ($\varepsilon = 0.26$ mm) with diameter of 16 cm and the pump is 75 percent efficient, **what is the input power required**? $\upsilon = 1.01\times10^{-6}\ m^2/s$.



3. Water is pumped from a lake into the atmosphere (Water surface elevation is 50 m), shown in the figure below. The length of inlet pipe is 50 m, with a diameter D = 0.07m, and equivalent roughness ε = 0.08 mm. The entrance loss coefficient is k_e = 0.8; head loss for flanged 45° elbow is negligible. If the flowrate is Q = 0.011 m^3/s, **what is the maximum elevation of the pump** that can be used without cavitation occurring? The vapor pressure of water is 1.228 kPa (abs), and atmospheric pressure is 101.3 kPa (abs); $\upsilon=1.01\times10^{-6}\ m^2/s$.