CE 313 Midterm I, Winter 2013

Instructor: Dr. Arturo Leon TA: YunJi Choi

Name: _____ **Date:** 02/08/2013

- ✓ **The exam duration is 50 minutes. Exam is closed book, closed notes and open mind.**
- ✓ **The exam is out of 100 points.**
- ✓ **CHOOSE EITHER PROBLEM 5 OR 6 TO SOLVE. Enter in the box below the problem you want to be graded (5 or 6)**

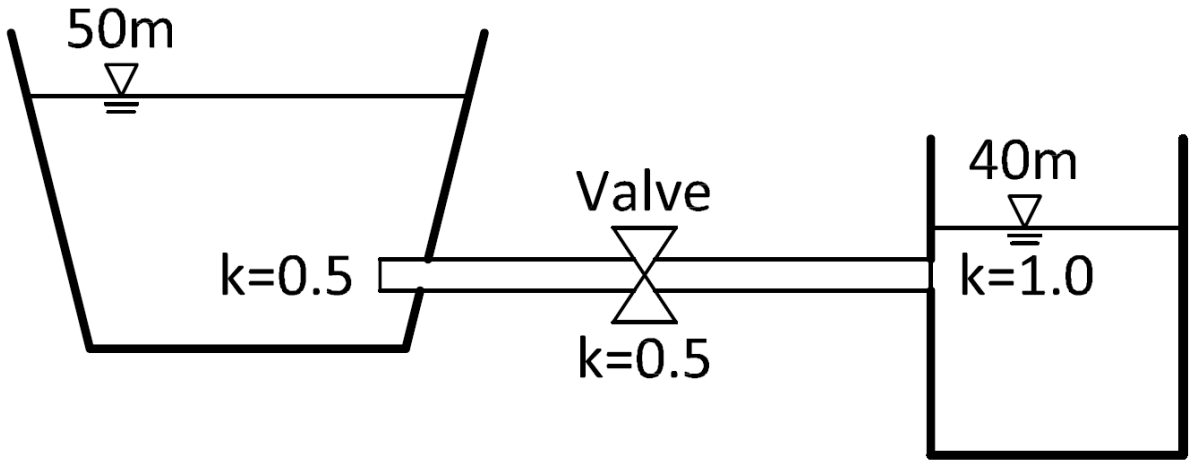
- ✓ **The procedure for problems other than the multiple choice questions will be graded. Please justify your answers**
- ✓ **Only specified calculators in the syllabus will be permitted**
- ✓ **Use the exam sheets only for completing the exam unless authorized by the instructor**

1. (5 pts) The minor losses in a piping systems are
   a. Always less than the major losses
   b. Assumed to vary linearly with the pipe length
   c. Assumed to vary linearly with the flow discharge
   d. Found using loss coefficients
   e. Both A and C

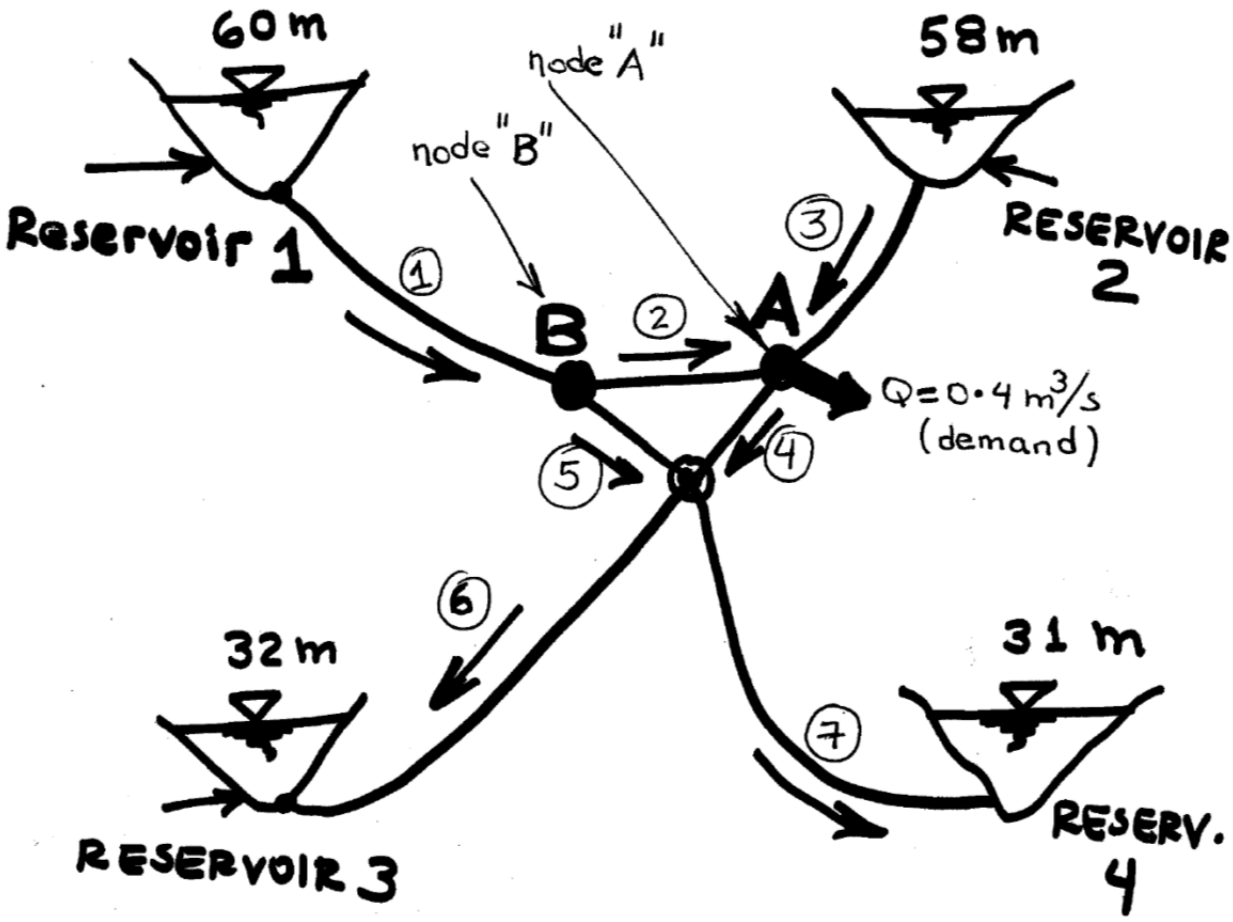
2. (5 pts) Which of the following statement best describes the friction factor?
   a. The friction factor was derived from Newton's 2nd Law.
   b. The friction factor was derived using both the conservation of mass and conservation of energy.
   c. The friction factor was derived empirically from laboratory observations of pressure drop in a pipe.
   d. The friction factor was derived theoretically assuming fully turbulent flow

3. (5 pts) Which of the following is true
   a. The Hydraulic Grade Line (HGL) and pipe elevation are sufficient to determine the pressure in the pipe.
   b. The difference between the HGL and Energy Grade Line (EGL) can provide the velocity head in the pipe.
   c. The EGL must always be greater than or equal to the HGL.
   d. All of the above.

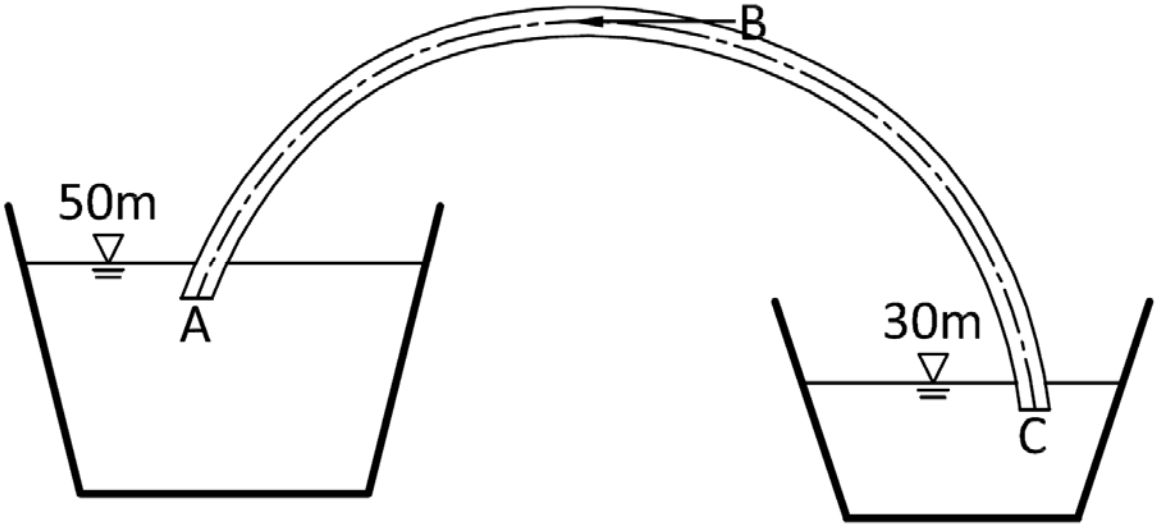
4. (35 pts) Calculate "*f*" in the system below if the flow discharge is $2m^3/s$. The local head loss coefficient at the valve is 0.5, the pipe length is 1000m and the pipe diameter is 1m.



5. (35 pts) In the pipeline system depicted below, **(1)** write the continuity equation at node "B", **(2)** write the compatibility conditions for total heads at node "A", **(3)** write the boundary condition at reservoir 1 (include local head losses) and **(4)** write the friction head loss equation for pipe 4.



6. (35 pts) In the system below, find the **MAXIMUM** elevation of point B that doesn't produce cavitation. Use f = 0.020, pipe diameter for the whole system D = 0.2m, pipe length between points A and B is 600 m and between points B and C is 1000 m. Assume that the vapor pressure head (gage or manometric) is -10.1m and neglect minor head losses.



7. (15 pts) Sketch the EGL and HGL for the pipeline shown below.

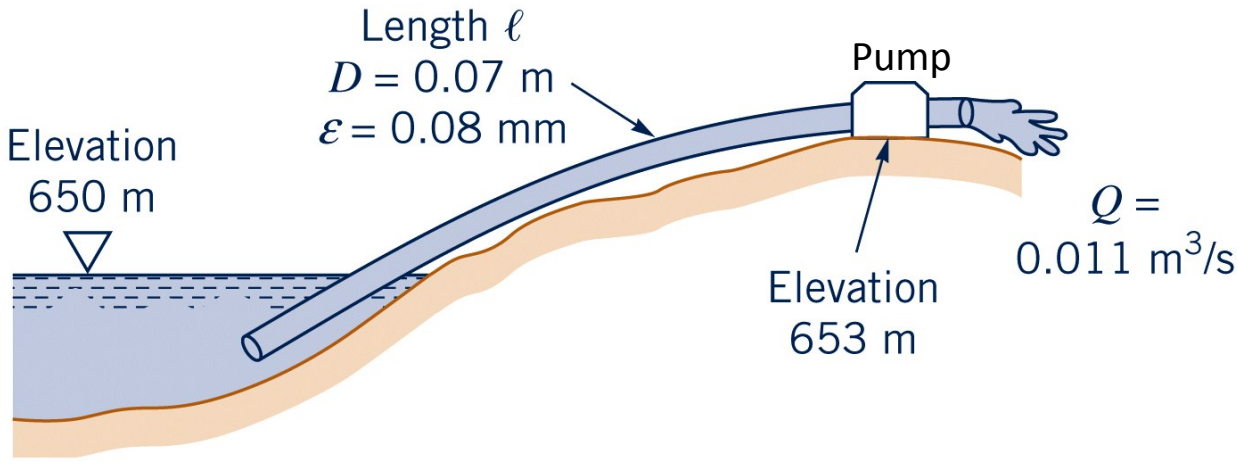


Figure P8.79

CE 313 Midterm I, Winter 2013
Equation Sheet

*Please keep it attached to the rest of the exam

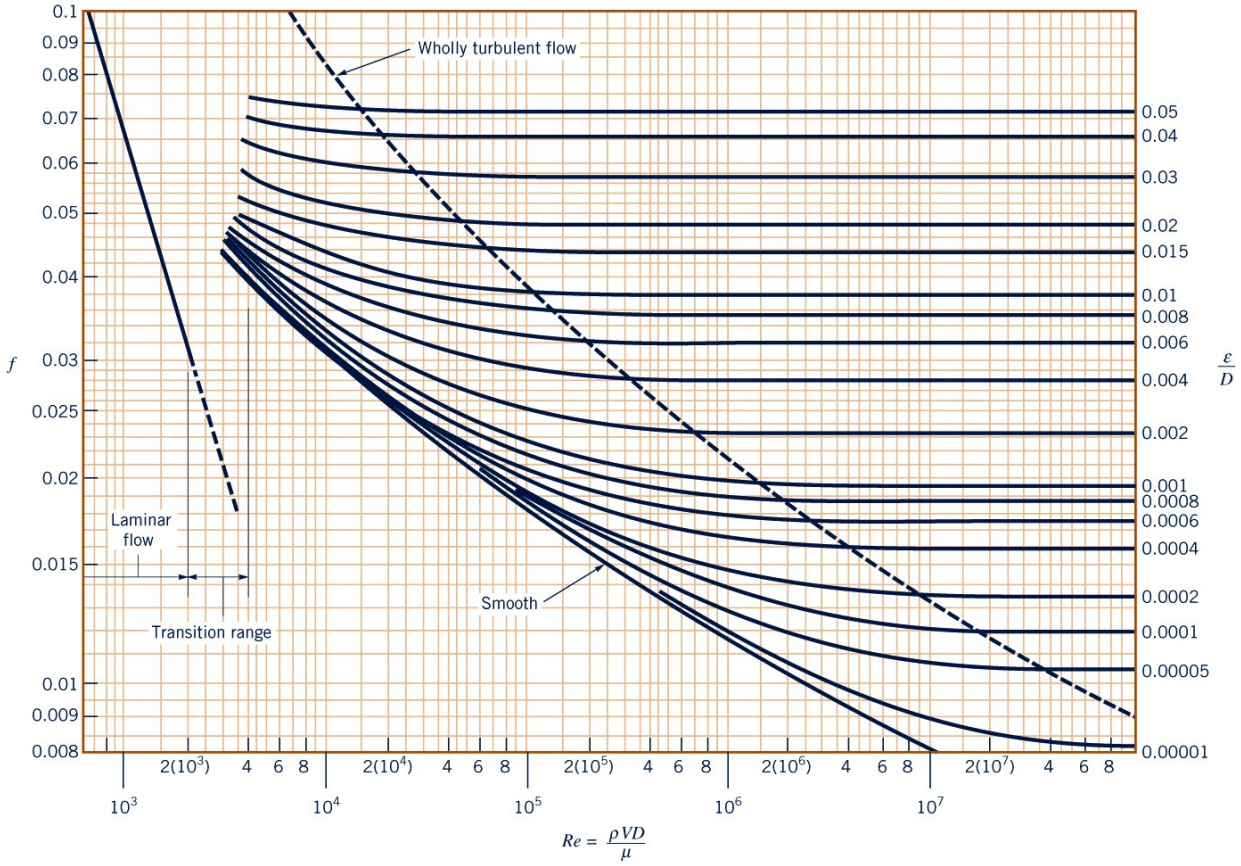


Figure 8.20

$$\rho_w = 999 \frac{kg}{m^3}$$

$$\mu_w = 1.12 \times 10^{-3} N \cdot s/m^2$$

$$h_L = f \frac{l}{D} \frac{V^2}{2g}$$

$$h_L = K_L \frac{V^2}{2g}$$

$$Re = \frac{\rho V D}{\mu}$$