CE 313 Hydraulic Engineering
Winter 2013 Test Form 1

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Quiz 6 **Name:** ______________________________

Answer the following questions to the best of your ability.

1. (15pts)Water flow through a 40-mm-diameter nozzle meter in a 75-mm-diameter pipe at a rate of 0.015m^3/s. Determine the pressure difference in kPa across the nozzle if the temperature is 10°C.
    a. $6.73x10^4$
    b. $6.73x10^3$
    c. 673.2
    d. 67.3
    e. 6.73

2. (15pts)Which of the following descriptions is a correct statement in waterhammer flows?
    a. Pressure and velocity remain constant immediately after a transient flow
    b. Velocity increases significantly immediately after a transient flow
    c. Pressure increases significantly immediately after a transient flow
    d. b and c
    e. None of the above

3. (15pts)Which of the following descriptions is a correct statement in waterhammer flows?
    a. Fluid is assumed to be compressible
    b. Fluid is assumed to be incompressible
    c. Cavitation occurs in a transient flow at all times
    d. a and c
    e. b and c

4. (15pts)The flow velocity in a pipeline is 10 m/s and the pressure wave celerity is 500 m/s. If a valve at the end of the pipeline is closed instantaneously, what will be the pressure head increase experienced in the pipeline?
    a. 5.9m
    b. 59.7m
    c. 509.7m
    d. 5097m
    e. 0.5m

5. (20pts)Water flows through the Venturi meter shown below. The specific gravity of the manometer fluid is 2. Determine the flowrate.

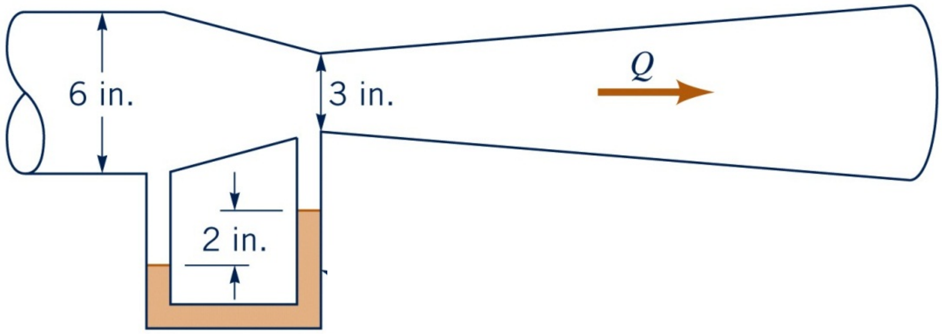
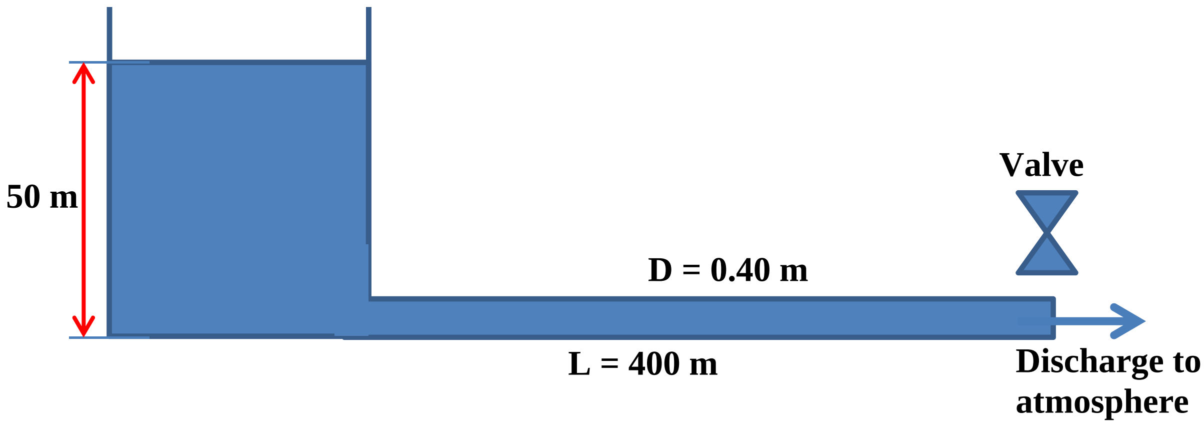


Figure P8.125

6. (20pts)The **horizontal** pipe depicted below is flowing in steady conditions. If the valve at the end of the pipe is closed instantaneously, what will be the maximum and minimum pressure head that will develop in the pipe? Is cavitation a problem? The pressure wave celerity is 1000 m/s and f =0.020.



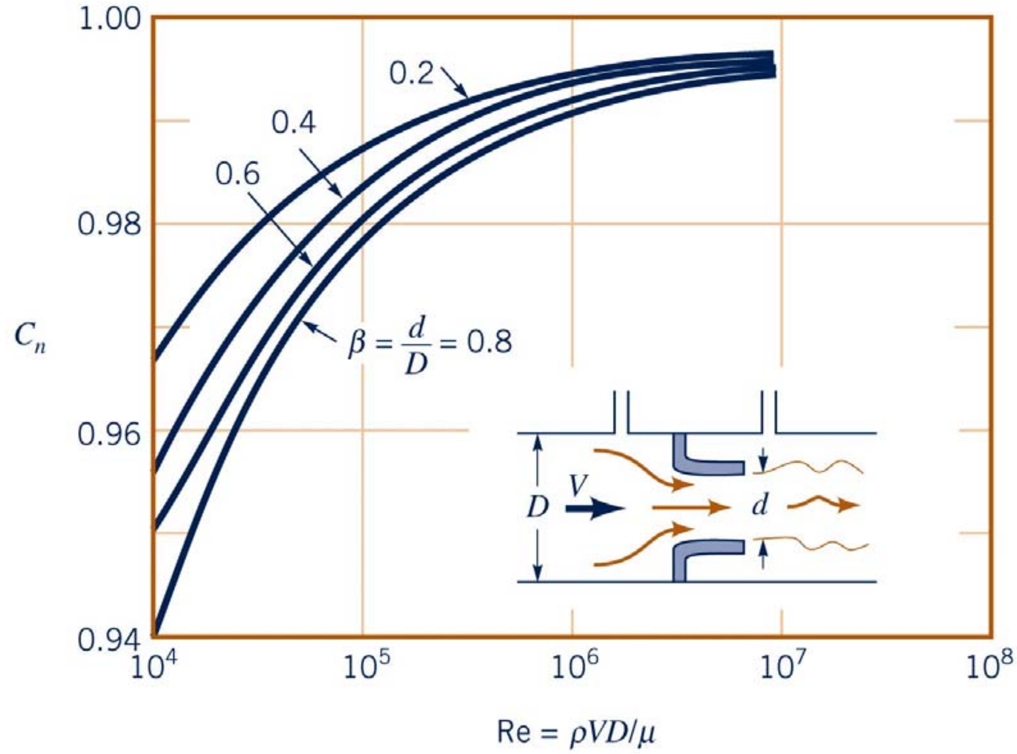


Figure 8.43

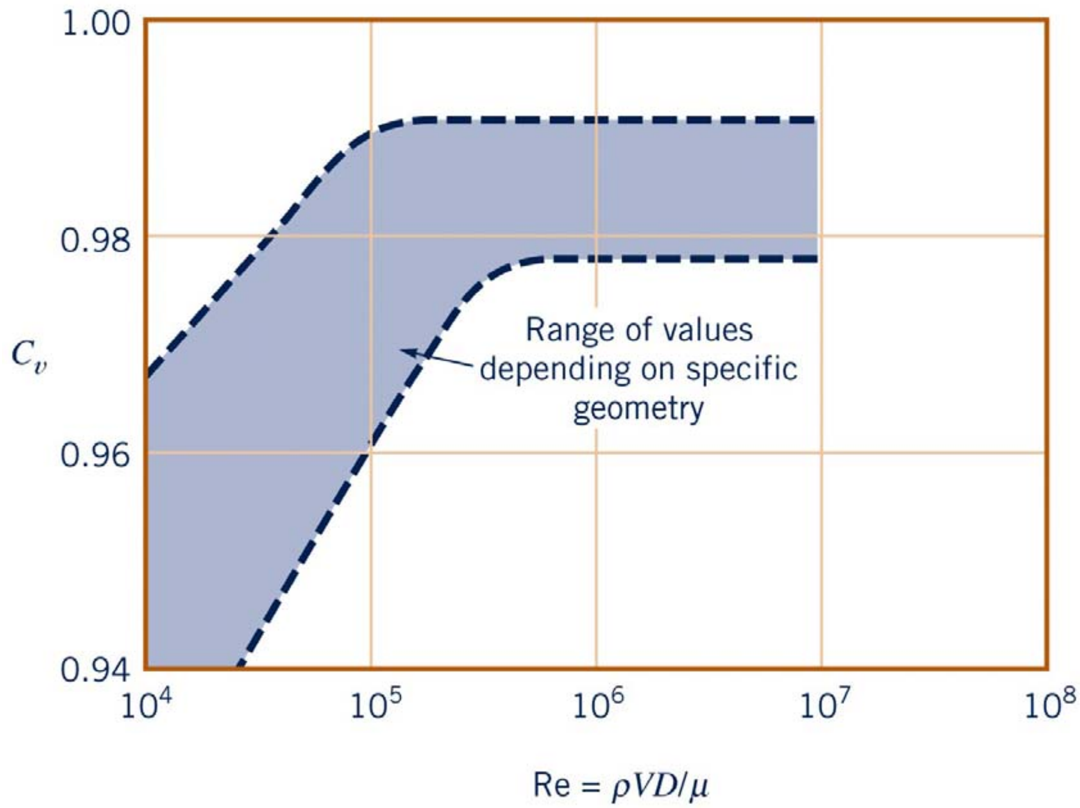


Figure 8.45

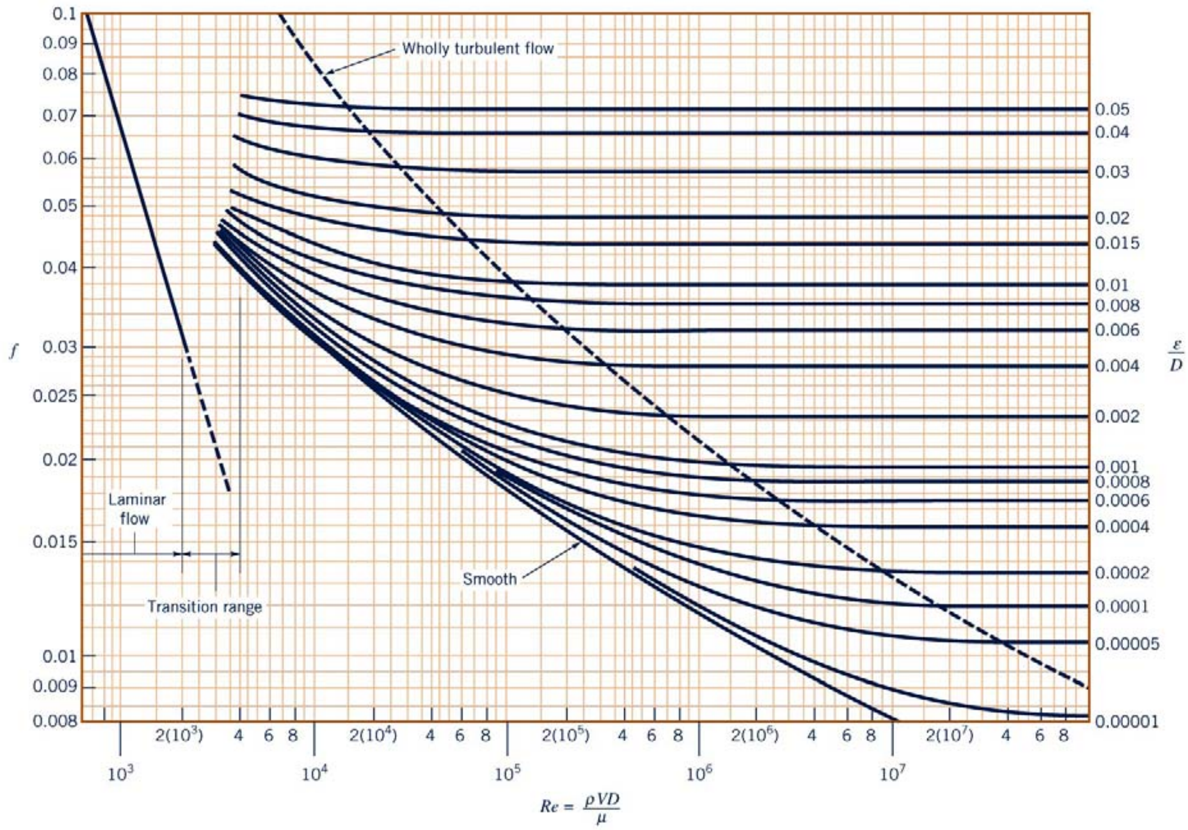


Figure 8.20

At 10°C, $\rho_w = 999.7 kg/m^2$ $and\ v = 1.307 \times 10^{-6} m^2/s$

In general, $\rho_w = 999\frac{kg}{m^3}$ and $v_w = 1.12 \times 10^{-6} m^2/s$

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

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

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

$$Q = C_n Q_{ideal} = C_n A_n \sqrt{\frac{2(p_1 - p_2)}{\rho(1-\beta^4)}}$$

$$Q = C_v Q_{ideal} = C_v A_T \sqrt{\frac{2(p_1 - p_2)}{\rho(1-\beta^4)}}$$

$$\beta = \frac{d}{D}$$