Homework 9 – Due May 1 2013

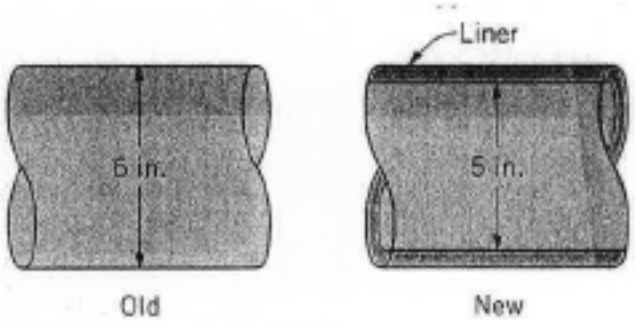
Questions: 8.8, 8.34, 8.48,8.62, 8.100 (use figure 8.23 for this problem – cut and paste below)

1)

**8.8** A soft drink with the properties of 10 °C water is sucked through a 4-mm-diameter, 0.25-m-long straw at a rate of 4 $cm^3/s$. Is the flow at the outlet of the straw laminar? Is it fully developed? Explain.

2)

**8.34** Water flows at a rate of 2.0 $ft^3/s$ in an old, rusty 6-in.-diameter pipe that has a relative roughness of 0.010. It is proposed that by inserting a smooth plastic liner with an inside diameter of 5 in. into the old pipe as shown in Fig. P8.34 the pressure drop per mile can be reduced. Is it true that the lined pipe can carry the required 2.0 $ft^3/s$ at a lower pressure drop than in the old pipe? Support your answer with appropriate calculations.




■ FIGURE P8.34

3)

**8.48** Air flows through the fine mesh gauze shown in Fig. P8.48 with an average velocity of 1.50 m/s in the pipe. Determine the loss coefficient for the gauze.

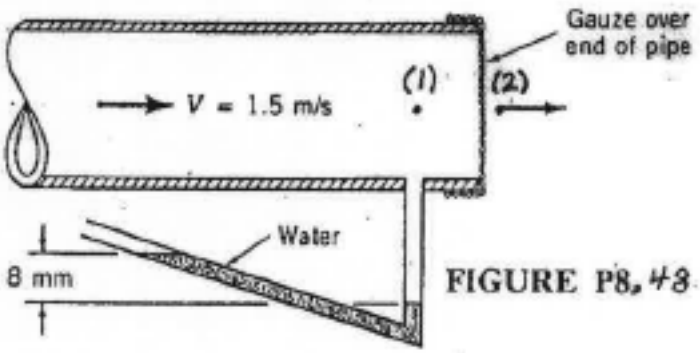
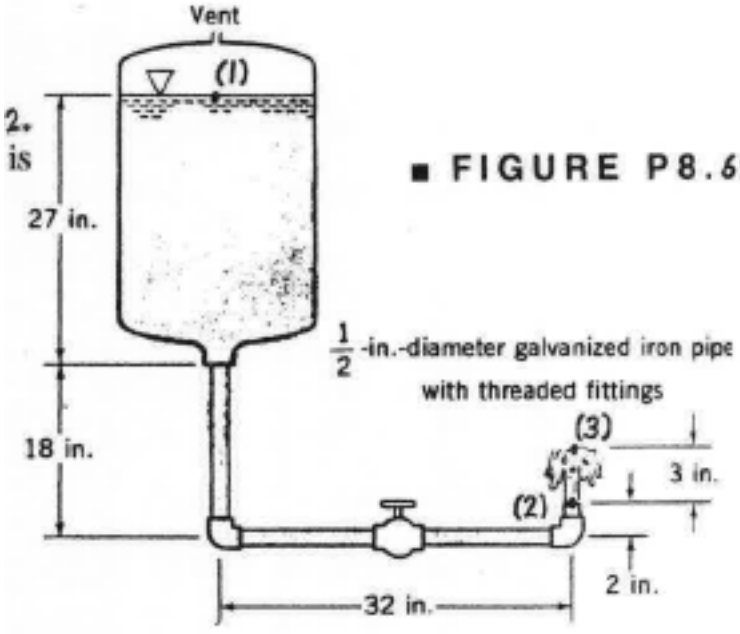



FIGURE P8.48

4)

**8.62** Water flows from the container shown in Fig. P8.62. Determine the loss coefficient needed in the valve if the water is to "bubble up" 3 in. above the outlet pipe.




■ FIGURE P8.62

5)

**8.100** Water flows through the orifice meter shown in Fig. P8.100 at a rate of 0.10 cfs. If $d = 0.1$ ft, determine the value of $h$.

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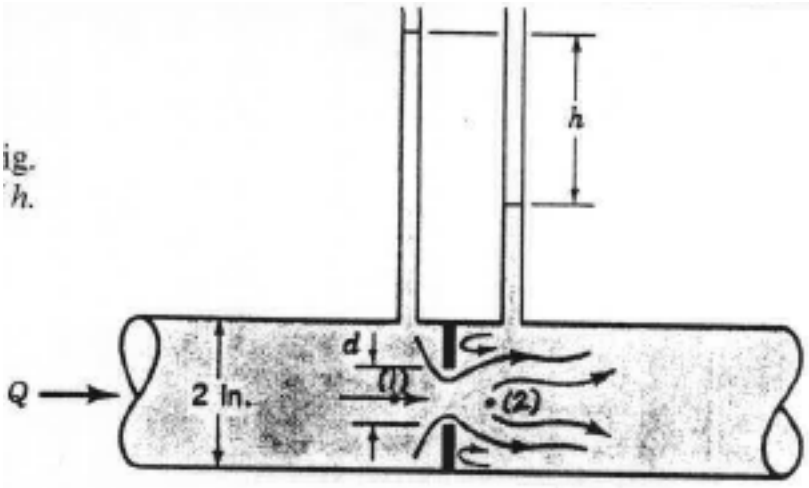
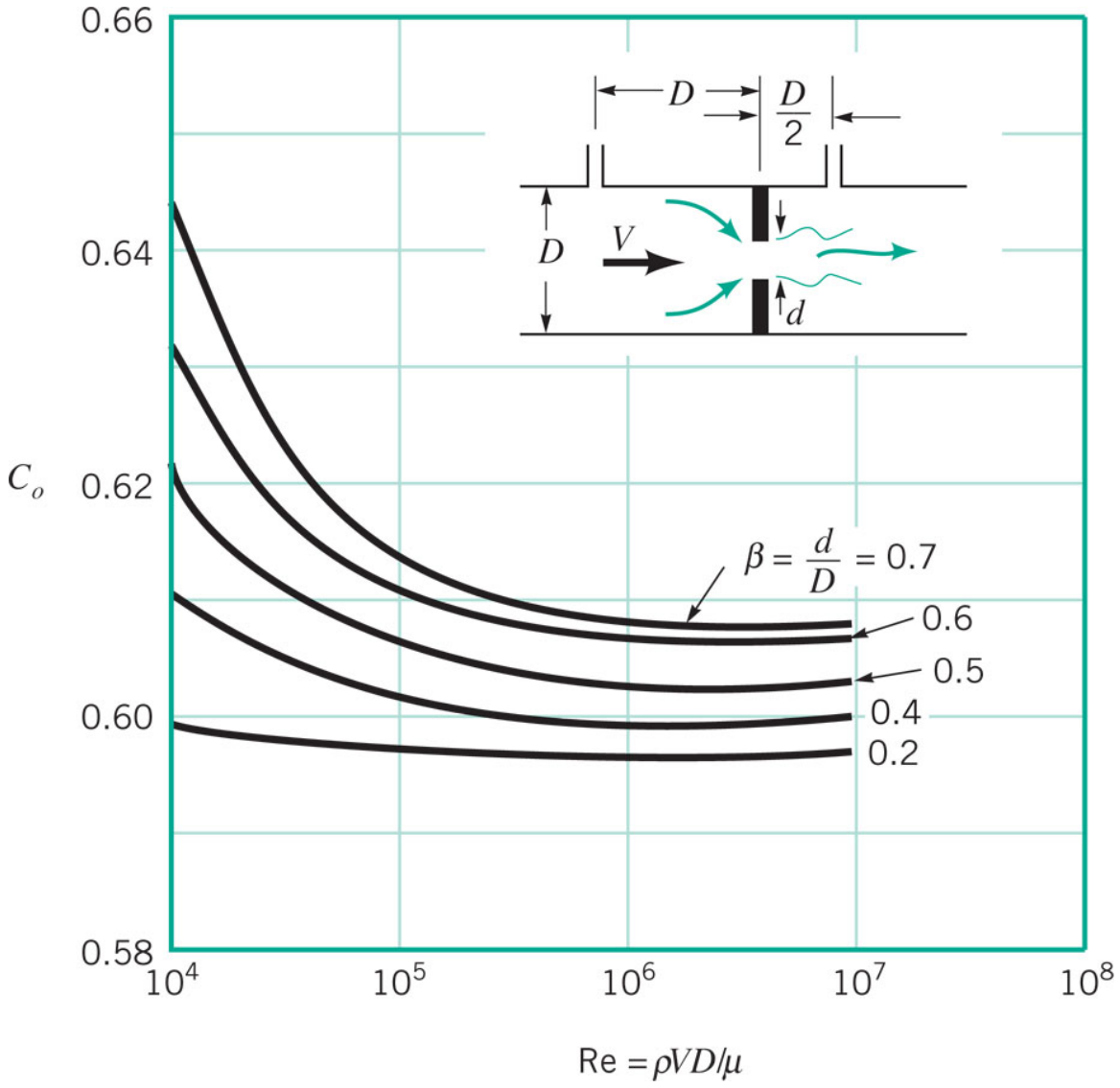
h.




0.66
0.64
0.62
0.60
0.58
$C_o$
$10^4$
$10^5$
$10^6$
$10^7$
$10^8$
Re $= \rho VD/\mu$
$D$
$\frac{D}{2}$
$D$
$V$
$d$
$\beta = \frac{d}{D} = 0.7$
0.6
0.5
0.4
0.2