

Problem 4 (25%)

The system in Figure 3 consists of 200 m long, 5 cm diameter cast-iron pipe, two 45° and four 90° flanged long-radius elbows, a fully open flanged globe valve, and a sharp exit into a reservoir. The elevation of reservoir free surface is 500 m above point 1. A pump is installed at point 1 to deliver 0.05 m³/s of water at 20°C into the reservoir, the efficiency of the pump is 85%?

Calculate friction head.

- Calculate friction head loss h_f in the piping system?
- Calculate minor losses h_{minor} for the system?
- Calculate gauge pressure at point 1?
- Calculate pump head h_p , and required pump power, kW.

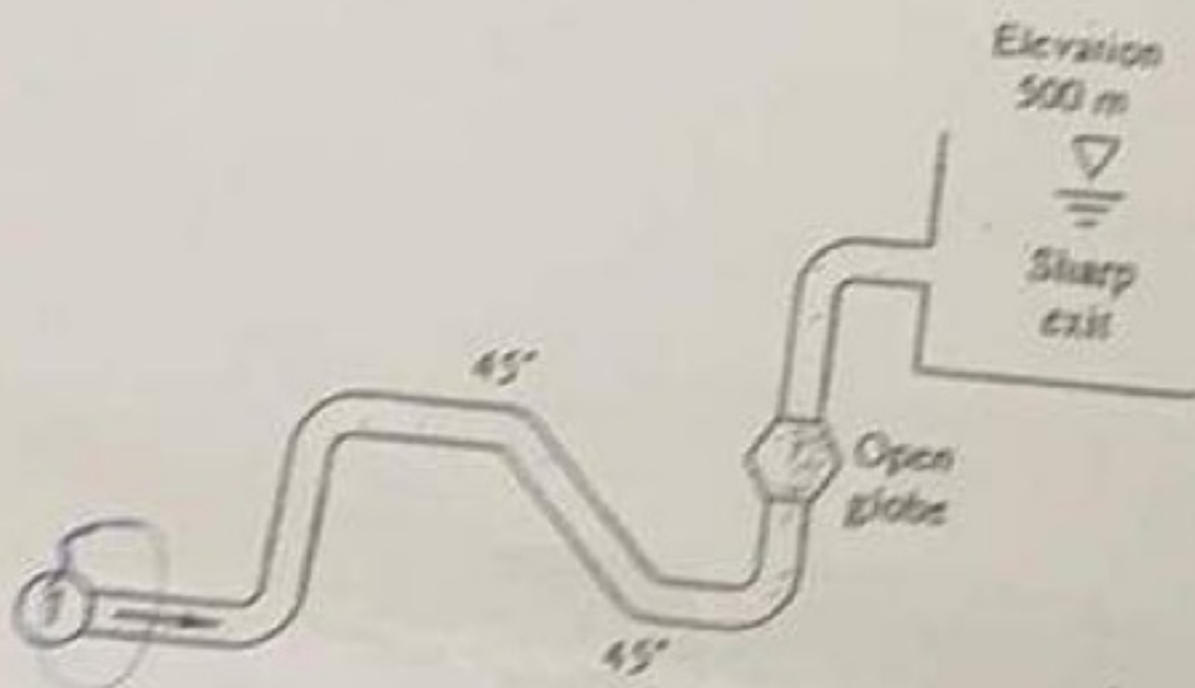


Figure 3

45°

45°

$4 \times 90 = 4(6)(4)$

$30, 7$