

# ENGR 207 Assignment 5

Mohamed Hussien El-Deeb (201900052)

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# 1 Problem 1

<https://docs.google.com/spreadsheets/d/1CzIPJ5D-QBWlSUav1pO0Eagw1V6teXcCctc4o4u9bNA/edit?usp=sharing>

## 2 Problem 2

<https://colab.research.google.com/drive/1tJ9nPd0Ms2XQzqH3ap3Lk13XZ3JCr2qA?usp=sharing>

### 3 Problem 3

$$Q = 40 \text{ L/s} = 0.04 \frac{\text{m}^3}{\text{s}}$$

$$V_1 = \frac{Q}{A_1} = \frac{Q}{\pi \left(\frac{D_1}{2}\right)^2} = \frac{Q}{\pi (0.15 \text{ m})^2}$$

$$= 0.5659 \frac{\text{m}}{\text{s}}$$

$$V_2 = \frac{Q}{A_2} = \frac{Q}{\pi (0.1 \text{ m})^2} = 1.273 \frac{\text{m}}{\text{s}}$$

$$P + \frac{\rho V^2}{2} = \text{const.}$$

$$\Delta P + \frac{\rho \Delta V^2}{2} = 0$$

$$\Delta P = P_1 - P_2 = \frac{\rho}{2} (V_2^2 - V_1^2)$$

$$P_1 - P_2 = 2gy(\rho_m - \rho)$$

$$y = \frac{\rho}{2g(\rho_m - \rho)} [V_2^2 - V_1^2]$$

$$= \frac{0.8}{2 \times 9.81 \frac{\text{m}}{\text{s}^2} (13.6 - 0.8)} \left( (1.273 \frac{\text{m}}{\text{s}})^2 - (0.5659 \frac{\text{m}}{\text{s}})^2 \right)$$

$$\approx 4.15 \text{ mm}$$

## 4 Problem 4

<https://docs.google.com/spreadsheets/d/1CzIPJ5D-QBWlSUav1pO0Eagw1V6teXcCctc4o4u9bNA/edit?usp=sharing>

## 5 Problem 5

<https://colab.research.google.com/drive/1tJ9nPd0Ms2XQzqH3ap3Lk13XZ3JCr2qA?usp=sharing>

## 6 Problem 6