Université d'Ottawa
Faculté de génie

Département de
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University of Ottawa
Faculty of Engineering

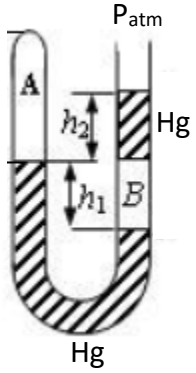
Department of
Chemical and Biological Engineering

CHG 1125
QUIZ 2

Last Name: _____
First Name: _____
Student Number: _____

Duration: 30 minutes, closed textbook, closed notes.

1. In a sealed-end manometer, mercury is used as the manometer fluid. **A** and **B** are air sealed in the manometer. Suppose the density of mercury is 13 594 kg/m^3; air is 1.29 kg/m^3, pressure P_{atm} = 760 mm Hg; h_1 = 20 cm, h_2 = 25 cm; 760 mm Hg = 101 325 Pa, 1 Pa = 1 kg/m.s^2; the gravitational acceleration g = 9.8 m/s^2. Calculate the **absolute** pressure in section **A**.



Convert P_{atm},

$$760\ mm\ Hg \times \frac{101\ 325\ Pa}{760\ mm\ Hg} = 101\ 325\ Pa = 101\ 325\ kg/m \cdot s^2$$

Use the hydrostatic pressure equation to solve for P_A,

$$P_A + \rho_{Hg} g h_1 = \rho_{air} g h_1 + \rho_{Hg} g h_2 + P_{atm}$$

$$P_A + \left(13\ 594 \frac{kg}{m^3}\right)\left(9.8 \frac{m}{s^2}\right)(0.20\ m) = (1.29\ kg/m^3)(9.8\ m/s^2)(0.20\ m) + (13\ 594\ kg/m^3)(9.8\ m/s^2)(0.25\ m) + (101\ 325\ kg/m \cdot s^2)$$

$$\boldsymbol{P_A = 107\ 989\ Pa}$$