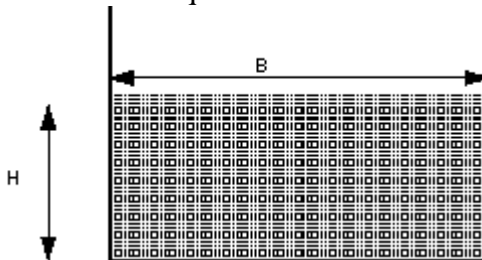


1/14/2003

FABE 325	Instructor:Dr. Kaletunç
<u>Homework #2</u>	TA : Kelley Yosick
	Winter 2003

Homework Due 1/21/2003

1. Convert the following temperatures (parts a and b) and temperature interval (part c)
 - a) $T = 20^{\circ}\text{C}$ to $^{\circ}\text{F}$, K , $^{\circ}\text{R}$
 - b) $T = -15^{\circ}\text{F}$ to $^{\circ}\text{C}$, $^{\circ}\text{R}$, K
 - c) $\Delta T = 20^{\circ}\text{C}$ to $^{\circ}\text{F}$, K , $^{\circ}\text{R}$
2. In agriculture, liquid flows in open channels. Weir devices are used to measure the flow rate of liquid.



The volumetric flow rate of water over a rectangular weir can be described by the following equation,

$$Q = \frac{2}{3} B \sqrt{2g} H^{3/2}$$

- a) Write the equation in terms of base dimensions to check whether equation is dimensionally homogeneous.
- b) Write the equation in terms of SI units to show the units on both side of the equation are consistent.

3. Pressure drop in a straight pipe can be calculated by using the following equation:

$$\Delta P = \frac{32 \mu L v}{D^2}$$

where, ΔP in Pa, μ in kg/(m s), L in m, v in m/s, and D in m.

Modify the equation so that the pressure drop would still be calculated in Pa but the other terms would be in AE units.

4. This question will be solved with MATLAB and the results will be submitted as MATLAB output.

The relationship between the pressure (P) and volume (V) of the air in a cylinder during the upstroke of a piston in an air compressor can be expressed as

$$PV^k = C$$

Where k and C are constant. During a compression test, the following data are taken.

P (mm Hg)	760	1140	1520	2280	3040	3800
V (cm ³)	48.3	37.4	31.3	24.1	20.0	17.4

Write MATLAB program,

- To plot V as a function of P . Is the relationship linear or non-linear?
- If the relationship is non-linear, put the equation into linear form
- To plot both the data and fitted curve.
- Write the fitted equation.to plot fitted curve
- Label the plot and axes
- Determine the values of k and C that best fit the data. (Give both numerical values and units.)