MEMS 0051 - Introduction to Thermodynamics
Quiz #1

Name: _____

Problem #1

A pressure of 100 [MPa] is applied to an area of 0.01 [m^2]. What is the force acting on the area?

$$F = PA = 100 \cdot 10^6 [\text{Pa}] \cdot 0.01 [\text{m}^2] = 1 \cdot 10^6 \, [\text{N}]$$

Problem #2

A liquid has a specific volume of 0.00125 [m^3/kg]. What is the density?

$$\rho = \frac{1}{\nu} = \frac{1}{0.00125 \, [\text{m}^3/\text{kg}]} = 800 \, [\text{kg/m}^3]$$

Problem #3

Determine if the following property is intensive or extensive:

1. Thermal diffusivity - Intensive
2. Total energy - Extensive
3. Mass - Extensive

Problem #4

Answer the following questions about the air compressor shown below. Note that the control surface is denoted with a dashed line. 1-2 word answers are fine.

- Is the given control volume a closed or open system? - Open
- Is the air flowing through this compressor undergoing a process or cycle? - Process
- Assume we know the pressure of the air entering the compressor. Do we know the state if we know that property? - No, two properties are needed to define a state.

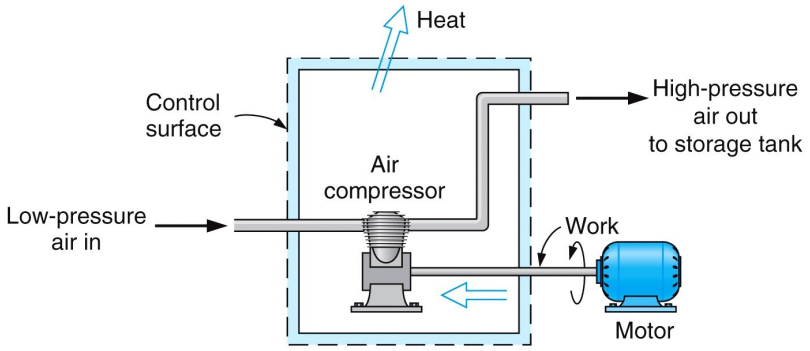

Figure 1.5