

Quiz #2

MEMS 0051 - Introduction to Thermodynamics

Assigned: February 15th, 2021
Due: February 19th, 2021, 9:00 pm

Intermediate Problem #1

(1 pt) A frictionless piston-cylinder device contains 0.2 [kg] of liquid water. Heat is added, in a constant-pressure process of 100 [kPa], until the water completely vaporizes. Determine the change of volume between the initial and final states.

Intermediate Problem #2

(1 pt) A rigid, non-deformable tank contains 10 [kg] of water at 90 °C. If 8 [kg] of the 10 is a liquid, while the remainder is a vapor, determine the volume of the tank.

Intermediate Problem #3

(1 pt) Consider water vapor existing at 350 °C and a specific volume of 0.029 95 [m³/kg]. Determine the pressure this substance is existing at using a) the steam tables and b) the Ideal Gas law.

Challenge Problem #1

(2 pt) Consider a situation where you have a rigid, non-deformable tank that is separated into two equal volumes by a membrane. One side of the tank contains 5 [kg] of water at a temperature of 25 °C and a pressure of 200 [kPa]. The other side is a vacuum. Then, the membrane is broken, allowing the water to fill the entirety of the tank. After sufficient time has passed, the temperature of the water has returned to 25 °C. Determine:

1. The complete volume of the tank (i.e. considering both partitions);
2. The final pressure within the tank;
3. The heat transferred during this process.

Academic Integrity Statement:

I hereby attest that I have received no assistance (from a friend, from another student, from an on-line resource, such as Chegg, etc.), and that I have provided no assistance to another student, during this examination. All the work presented within is solely my own work.

Signature: _____

Date: _____