

**MEMS 0051 - Introduction to Thermodynamics**  
**Quiz #2**

Name: Solution

**Problem #1**

Determine the specific volume of saturated water given a pressure of 6,382 [kPa] and a quality of 29.5%.

Using Table B.1.2 on page 782, we have to create a pressure entry for 6,382 [kPa], i.e. create a saturated liquid and saturated vapor specific volume entry. Starting with the saturated liquid:

$$\frac{(6,382 - 6,000) \text{ [kPa]}}{(7,000 - 6,000) \text{ [kPa]}} = \frac{(\nu_f - 0.001319) \text{ [kg/m}^3\text{]}}{(0.001351 - 0.001319) \text{ [kg/m}^3\text{]}}$$
$$\implies \nu_f = 0.001331 \text{ [kg/m}^3\text{]}$$

Finding  $\nu_g$ :

$$\frac{(6,382 - 6,000) \text{ [kPa]}}{(7,000 - 6,000) \text{ [kPa]}} = \frac{(\nu_g - 0.03244) \text{ [kg/m}^3\text{]}}{(0.02737 - 0.03244) \text{ [kg/m}^3\text{]}}$$
$$\implies \nu_g = 0.03050 \text{ [kg/m}^3\text{]}$$

Lastly, the specific volume can be found via quality such that:

$$\nu = (1 - x)\nu_f + x\nu_g = (1 - 0.295)(0.001331 \text{ [kg/m}^3\text{]}) + (0.295)(0.03050 \text{ [kg/m}^3\text{]})$$
$$\implies \nu = 0.009936 \text{ [kg/m}^3\text{]}$$