**Questions to practice properties of fluids calculations and table reading – Week 4**

**From Chapter 1.5 to 1.7**

1. If the steam at 9 bar is further reduced to 1 bar by an isentropic process, what is the dryness fraction of the steam produced at the end of the process, and what is the temperature?
2. Use the spreadsheet produced in the consolidation session to a plot of temperature vs. specific entropy plot for saturated water and saturated steam with constant pressure lines for 10 bar and 160 bar. This should show the saturation line across the chart and the superheat behaviour for specific entropy.
3. Calculate the *kinematic* viscosity of water liquid and vapour at 75°C. What do you notice about the comparison of vapour and liquid when expressed in this way as opposed to dynamic viscosity? Hint: you need density via specific volume.
4. Interpolate the conductivity of dry air tables to find the conductivity at 88°C. Compare this with the conductivity of saturated steam at 88°C.
5. The atmospheric pressure at 4000 m elevation above sea level is found on p.24 of the tables. What is the saturation temperature at this height? You may need to interpolate on p.3 of the tables.

**From Chapter 2.1 to 2.3a**

1. A mountaineer boils water on a 4,000m mountain top? What is the atmospheric temperature there? What temperature would a cup of tea be there?
2. What pressure is required in a freezer compartment evaporator coil using refrigerant R134a if the temperature is to be maintained at -20°C?
3. What are the enthalpy and entropy when the R134a is all liquid and then when it is all vapour? What does the change in entropy between the two states tell you?

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4. Assuming a mass flow rate of R134a of 20g/s, and making use of the SFEE, what heat transfer rate occurs in the evaporator if the refrigerant leaves at saturated gas condition (i.e. just all vapour, with no superheat) and enters at saturated liquid condition (i.e. just all liquid and no sub-cooling)?