HOMEWORK PROBLEMS: Lesson 5

Adapted from Moran, Shapiro, Boettner, & Bailey, *Fundamentals of Engineering Thermodynamics*, 8th Ed.

5-1 Determine the phase or phases in a system consisting of H_2O at the following conditions and sketch p–v and T–v diagrams showing the location of each state.

Determine the phase or phases in a system consisting of H_2O at the following conditions and sketch p–v and T–v diagrams showing the location of each state.

(a) p=10 bar, T=179.9°C.
(b) p= 10 bar, T=150°C.
(c) T=100°C, p= 0.5 bar.
(d) T=20°C, p= 50 bar.
(e) p=1 bar, T=-6°C

5-2 The following table lists temperatures and specific volumes of water vapor at two pressures:

p = 1.0 MPa		p = 1.5 MPa	
T [°C]	v [m³/kg]	T [°C]	v [m³/kg]
200	0.2060	200	0.1325
240	0.2275	240	0.1483
280	0.2480	280	0.1627

Data encountered in solving problems often do not fall exactly on the grid of values provided by property tables, and linear interpolation between adjacent table entries becomes necessary. Using the data provided here, estimate

(a) the specific volume at T = 240°C, p=1.25 MPa, in m³/kg.
(b) the temperature at p=1.5 MPa, v=0.1555 m³/kg, in °C.
(c) the specific volume at T=220°C, p=1.4 MPa, in m³/kg