Homework #1

MEMS 0051 - Introduction to Thermodynamics

Assigned January 18$^{\text{th}}$, 2020
Due: January 24$^{\text{th}}$, 2020

Problem #1

Given the following properties, determine the remaining properties (i.e. pressure, temperature, specific volume and quality, if applicable), for water. Indicate if the water is existing as a compressed/subcooled liquid, saturated liquid water, saturated vapor or superheated steam. Additionally, using the Matlab Script titled "`Pv_and_Tv_curves`.m", plot and label each item on both a $P-\nu$ and $T-\nu$ diagram. Note: interpolation may be required multiple times.

(a) $T = 145$ [°C], $\nu = 0.2$ [m^3/kg]
(b) $T = 255$ [°C], $P = 3{,}000$ [kPa]
(c) $T = 370$ [°C], $P = 15{,}000$ [kPa]
(d) $T = 100$ [°C], $\nu = 16.8$ [m^3/kg]
(e) $T = 200$ [°C], $P = 5{,}000$ [kPa]
(f) $P = 760$ [kPa], $x = 0.72$
(g) $P = 125$ [kPa], $T = 20$ [°C]
(h) $P = 1{,}300$ [kPa], $\nu = 0.254$ [m^3/kg]
(i) $P = 1{,}250$ [kPa], $T = 63$ [°C]
(j) $T = 100$ [°C], $P = 101.3$ [kPa]
(k) $T = 180$ [°C], $P = 2{,}000$ [kPa]
(l) $T = 160$ [°C], $P = 400$ [kPa]
(m) $T = 400$ [°C], $P = 200$ [kPa]
(n) $T = 133.5$ [°C], $P = 300$ [kPa]
(o) $T = 100$ [°C], $P = 800$ [kPa]
(p) $P = 100$ [kPa], $\nu = 1.500$ [m^3/kg]
(q) $P = 100$ [kPa], $\nu = 2.500$ [m^3/kg]
(r) $P = 500$ [kPa], $\nu = 0.001070$ [m^3/kg]
(s) $T = 50$ [°C], $\nu = 5.0$ [m^3/kg]
(t) $T = 150$ [°C], $\nu = 1.5$ [m^3/kg]
(u) $T = 100$ [°C], $\nu = 0.001043$ [m^3/kg]
(v) $T = 320$ [°C], $P = 200$ [kPa]
(w) $T = 105$ [°C], $P = 2{,}000$ [kPa]
(x) $T = 60$ [°C], $P = 200$ [kPa]
(y) Saturated liquid at 400 [kPa]
(z) Saturated vapor at 125 °C