10.213 Fall 1999

Problem 7 (due Friday, September 24)

a) For steam at 200 ºC and 1400 kPa estimate the residual properties, V^R, H^R, and S^R, using the Lee/Kessler generalized correlations.

b) Repeat the calculation of V^R, H^R, and S^R using data from steam tables.

c) Schematically, draw a ln(P) vs. H diagram for steam showing the saturated-liquid vapor dome and label the critical point. Also, show the lines of constant temperature and entropy passing through the state defined by at 200 ºC and 1400 kPa. Finally, represent H^R as a line segment on this graph.

d) Express the derivative representing the slope of an isotherm a ln(P) vs. H diagram, $[d(\ln P)/dH]_T$, in terms of P,V,T,C_p and their derivatives only.

e) Evaluate the slope determined in part d for an ideal gas.