CHEG 2313 Thermo I HW#7 Spring 2016

Due Wednesday, April 6th at the beginning of class.

1. In class we worked through Illustration 4.5-1 in your book. Solve the problem again, this time accounting for the temperature dependence of air (using App A-II). (6 pts)
2. 1 mol of Nitrogen (N2) enters a steady-state flow process at 800K and 50 bar and exits at 300K and 1 bar. Assume that the heat is transferred into this process at the exit temperature. Determine the maximum work (J) that can be obtained.

Q

Nitrogen

T= 800K T = 300K

P = 50 bar P = 1 bar

W

1. Assume Nitrogen is an ideal gas with a constant Cp chosen from the following published table: (6 pts)

Temperature Specific Heat, Cp

(K) (kJ/kgK)

300 1.040

350 1.041

400 1.044

450 1.049

500 1.056

550 1.065

600 1.075

650 1.086

700 1.098

750 1.110

800 1.122

1. Assume Nitrogen is an ideal gas with a Cp given in App A.II. (8 pts)
2. Calculate the entropy generated by the flow of 10 mol/s of nitrogen at 500oC and 500 bar undergoing a Joule-Thomson expansion to 1 bar. For this case, assume nitrogen is an ideal gas with a Cp\*=3.923 kJ/kgK. (5 pts)