ME/Che EN 2300
Homework #8
Due Wednesday, March 7, 2007

#1 (4-63) Determine the internal energy change of hydrogen, in kJ/kg, as it is heated from 200 to 800 K, using (a) the empirical specific heat equation as a function of temperature (Table A 2c), (b) the c_v value at the average temperature (Table A-2b), and (c) the c_v value at room temperature (Table A 2a). Comment on your answers.

#2 (4-120) Which of the two gasses – neon or air – requires the least amount of work when compressed in a closed system from P_1 to P_2 using a polytropic process with n=1.5?

#3 (5-10, 6th edition; 5-8, 5th edition) A hair dryer is basically a duct of constant diameter in which a few layers of electric resistors are placed. A small fan pulls the air in and forces it through the resistors where it is heated. If the density of the air is 1.2 kg/m^3 at the inlet and 1.05 kg/m^3 at the exit, determine the percent increase in the velocity of the air as it flows through the dryer.

#4 (5-18, 6th edition; 5-15, 5th edition) Refrigerant 134a enters a 28 cm diameter pipe steadily at 200 kPa and 20 C with a velocity of 5 m/s. The refrigerant gains heat as it flows and leaves the pipe at 180 k Pa and 40 C. Determine (a) the volume flow rate of the refrigerant at the inlet, (b) the mass flow rate of the refrigerant, and (c) the velocity and volume flow rate at the exit.

#5 (5-31, 6th edition; 5-30, 5th edition) Air enters an adiabatic nozzle steadily at 300 kPa, 200 C and 30 m/s and leaves at 100 kPa and 180 m/s. The inlet area of the nozzle is 80 cm^2. Determine (a) the mass flow rate through the nozzle, (b) the exit temperature of the air, and (c) the exit area of the nozzle.