

ME/CH EN 2300
Homework # 3
Due Wednesday, January 31

Note: Please list which section of the class you are in (ME EN or CH EN) on your assignment

#1 (2-22) What are point and path functions? Give some examples.

#2 (2-24) Consider an automobile traveling at a constant speed along a road. Determine the direction of the heat and work interactions, taking the following as the system: (a) the car radiator, (b) the car engine, (c) the car wheels, (d) the road, and (e) the air surrounding the car.

#3 (4-1) On a P-V diagram, what does the area under the process curve represent?

#4 (4-17) (Do not use EES software) During some actual expansion and compression processes in piston-cylinder devices, the gasses have been observed to satisfy the relationship $PV^n=C$, where n and C are constants. Calculate the work done when a gas expands from 150 kPa and 0.003 m^3 to a final volume of 0.2 m^3 for the case of $n=1.3$.

#5 (4-5) The volume of 1 kg of helium in a piston cylinder device is initially 5 m^3 . Now helium is compressed to 3 m^3 while its pressure is maintained constant at 200 kPa. Determine the initial and final temperatures of the helium as well as the work required to compress it in kJ.

#6 (2-99) The inner and outer surfaces of a 0.5 cm thick 2 m x 2m window glass in winter are $10 \text{ }^\circ\text{C}$ and $3 \text{ }^\circ\text{C}$ respectively. If the thermal conductivity of the glass is $0.78 \text{ W/m }^\circ\text{C}$, determine the amount of heat loss, in kJ, through the glass over a period of 5 h. What would your answer be if the glass were 1 cm thick?