SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY

DEPARTMENT OF MATERIALS & METALLURGICAL ENGINEERING

# MET 320 HQ 1 Sept. 18, 2014

Closed book and notes No calculators No questions from students answered

Constants: R = 1.987 cal/(K•gmole) = 8.31 J/(K•gmole) = 0.08205 L\*atm/(K•gmole)

1. Ten moles of ideal diatomic gas at 300 K are compressed from 1 atm to 10 atm. Find q, w, U, and H if the process occurred
	1. Isothermally
	2. Adiabatically
	3. Isochorically
	4. Along a straight Line on a P-V Diagram to a final T of 300 K

2. Three moles of ideal monatomic gas at 500 K and 1 atm are isothermally expanded from 10 atm to 1 atm while performing only one fourth of the maximum possible work. The gas exchanges heat with a heat sink at 1000 K. Find the final ∆S for the

1. gas
2. heat sink.

3. What is the theoretical amount of work that would be required to pump 600 Joules of heat from the outside air at 280 K into an office at 300 K?

4. Five moles of an ideal diatomic gas at 1 atm and 400 K are adiabatically compressed to 10 atm.

 a) What is the final temperature?

 b) How much work was required?

 c) How much heat was lost from the gas?

Scratch Paper (take with you or discard)