Name: _____ CM Box: _____

Circle your section:

Sanders – 01   Sanders – 02   Lui – 03

ES 202
Fluid & Thermal Systems

Examination I
March 24, 2005

Problem	Score
1	/ 50
2	/ 25
3	/ 25
Total	/ 100

Show your work clearly for credit
Open table ONLY
One page of equation sheet allowed
Laptops allowed

Problem 1 (50 points)

Determine the thermodynamic properties for Water in the unshaded boxes of the table below, up to 4 significant figures. You may use the next page as work space. Use the following abbreviations when specifying any verbal description:

CL   = compressed (subcooled) liquid
SL   = saturated liquid
SM   = saturated mixture
SV   = saturated vapor
SHV   = superheated vapor

NA   = not applicable
INSUF = insufficient information

State	Phase	Pressure, P (kPa)	Temperature, T (°C)	Specific Volume, v (m^3/kg)	Specific Enthalpy, h (kJ/kg)	Quality, x
1		200			2000	
2		200		1.25		
3	SV	200				
4		200	100			
5			300		3066.8	
6		8581	300			
7	SL		300			
8			300			0.7

Workspace

Problem 2 (25 points)

Locate all identifiable states in Problem 1 (State 1 – State 8) on the *P-v* and *T-v* diagrams below.

P

200 kPa

v

T

300 °C

v
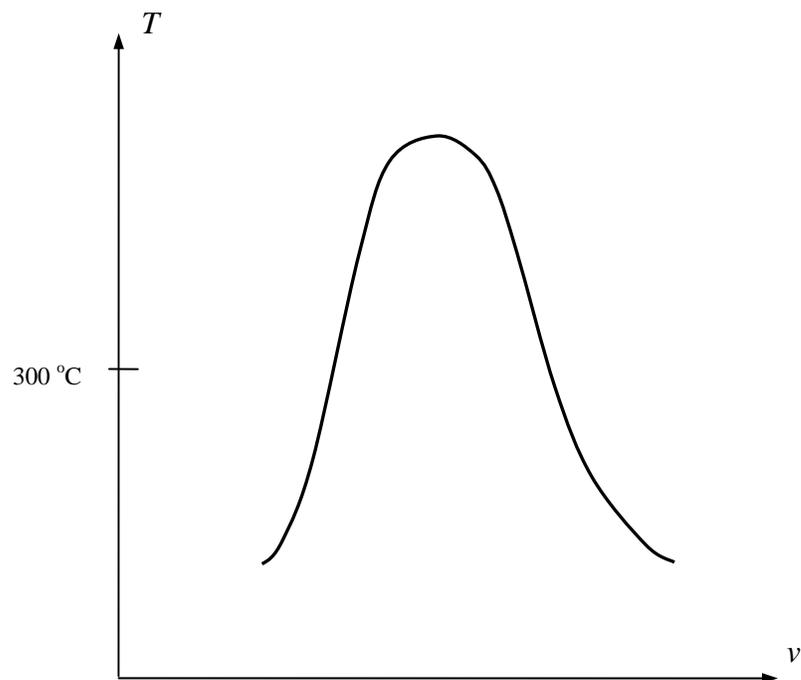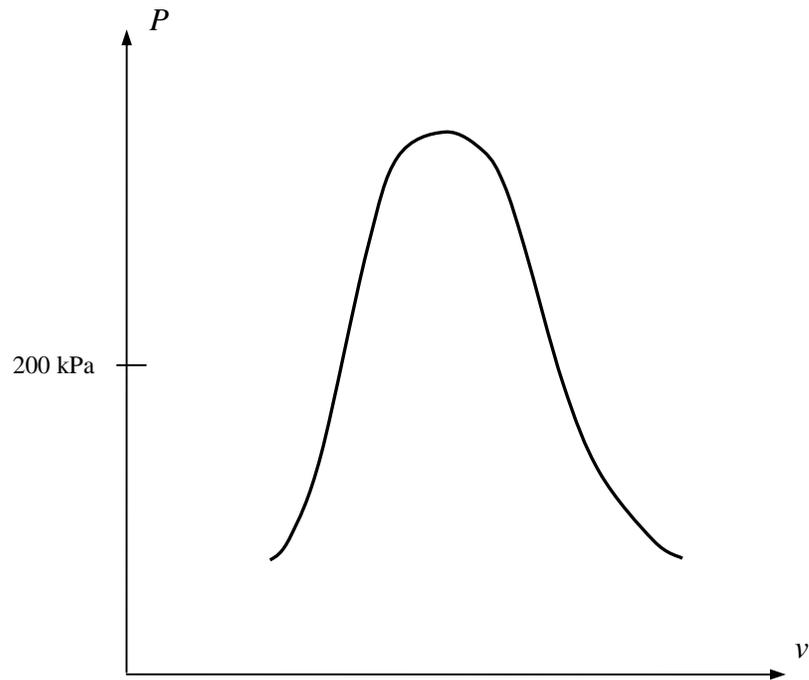
Problem 3 **(25 points)**

Given air at two different states:

State 1: $P_1 = 500$ kPa, $T_1 = 1000$ K

State 2: $P_2 = 100$ kPa, $T_2 = 300$ K (ideal gas)

a) Is the ideal gas model a reasonable approximation to State 1? Show your reasoning.

b) Determine the following quantities using the <u>most accurate</u> method available to you:

   i.   <u>change in specific enthalpy</u>: $h_2 - h_1 =$ _____ kJ/kg

   ii. <u>specific volume at State 2</u>: $v_2 =$ _____ m³/kg

   iii. <u>change in specific entropy</u>: $s_2 - s_1 =$ _____ kJ/kg-K