CADET _____ SECTION _____ TIME OF DEPARTURE _____

DEPARTMENT OF CHEMISTRY & LIFE SCIENCE

CH365 2022-2023
Thanksgiving Day Bonus
21 November 2022

TEXT: Smith, Van Ness, & Abbott
SCOPE: Lessons 22-32
SUGGESTED TIME: 30 Minutes

References Permitted: Open notes, book, internet, CHEMCAD, Mathematica, Excel.

INSTRUCTIONS

1. This is a BONUS exercise and is due **1630 28 November 2022**.
2. There are 2 problems on three pages (not including the cover page).
3. Save all electronic work to your SharePoint directory.
4. Write down the file name and file location.

(TOTAL WEIGHT: 40 POINTS)

DO NOT WRITE IN THIS SPACE

PROBLEM	VALUE	ADD
A	20	
B	20	
TOTAL BONUS	40	

Cadet:_____

Problem:	Weight:
A	20

In class we derived the Gibbs energy generating function (lesson 27 slides 21 and 22 and pages 224-225 in the textbook). The importance of the Gibbs energy generating function is that it is used to derive the residual Gibbs energy, residual entropy, and residual enthalpy (Lesson 28, slides 4 to 6 and pages 225-227 in the textbook).

Recall that the Helmholtz energy is defined as $A \equiv U - TS$ (eq. 6.3) and the fundamental property relation for Helmholtz energy is $dA = -PdV - SdT$ (eq. 6.10).

Instead of Gibbs energy, use Helmholtz energy to derive a generating function for the internal energy. That is, prove that U/RT is a function of A/RT.

Cadet:_____

Problem:	Weight:
B	20

Determine the change in entropy of a 25-pound turkey heated from 25 to 350 °C. For perspective, compare this to the entropy change of 25 pounds of air (as an ideal gas) undergoing the same temperature change at constant pressure.