Answer all 4 multiple choice questions justify answer for partial credit.

1. Which statement below is false? (10 points)

A) Every isolated system is closed.
B) Ideal gas isotherms lying farther from the P/V axes are higher temperature
C) The pressure of a mixture of non-ideal gases is equal to the sum of partial pressures (P_i = x_i/P)
D) Mass is an extensive property
E) A gas behaves less ideal at higher temperature

2. 1.0 mole of water vapor at 200˚C and 1 atm undergoes a cyclic process for which w = 145 J. Find q for this process. (10 points)

A) q = 1260 J
B) q = 145 J
C) q = 0 J
D) q = –145 J
E) q cannot be determined

3. Calculate ΔH for 2.50 mol of perfect gas (C_{V,m} = 1.5 R) which is taken from 1.50 atm at 400K to 3.0 atm at 600K where R = 8.31451 J mol^{-1} K^{-1}. (10 points)

A) –4157 J     B) –2881 J     C) 2494 J     D) 2881 J     E) 4157 J

4. What is the temperature of the hot reservoir if the efficiency of an engine operating between this reservoir and a 300K reservoir is e = 0.25. (10 points)

A) 1200 K     B) 400 K     C) 300 K     D) 225 K     E) 75 K

Choose 2 of the following three problems (5-7):

MW_{N_2} = 28.01 g mol^{-1}, MW_{He} = 4.00 g mol^{-1}, MW_{O_2} = 32.00 g mol^{-1}

5. For H_2O between 10-25˚C and 0.1-200 atm, α = (1/V) (∂V/∂T)_{P,n} = 1.7 x 10^{-4} K^{-1} and κ = – (1/V) (∂V/∂P)_{T,n} = 4.7 x 10^{-5} atm^{-1}. A closed, rigid container is completely filled with 100.0 mL of water at 14˚C and 1 atm. If the temperature of the container is raised to 20˚C, estimate the pressure inside the container. If the container is additionally compressed to 99.5 mL at 20˚C, estimate the pressure inside the container. Neglect pressure and temperature dependence of α and κ. (25 points)

6. For N_2 (g), C_{p,m} = 29.1 J mol^{-1} K^{-1} for the temperature range 100 to 400 K. Calculate q, w, ΔU, and ΔH for the reversible adiabatic compression of 1.12 g of N_2 (g) from 400.0 torr and 1000.0 cm^3 to a final volume of 250.0 cm^3. Assume ideal gas behavior, R = 8.31451 J mol^{-1} K^{-1} = 0.082056 L atm mol^{-1} K^{-1}. (25 points)

7. Calculate the ΔS of mixing 10.0 g of He at 120.0 °C and 1.50 atm with 10.0 g of O_2 at 120˚C and 1.50 atm. (25 points)

Using a short essay answer the following question:

8. Explain in your own words what is meant by the term “reversible”. (10 points)