MEMS 0051 - Introduction to Thermodynamics
Quiz #4

Name: _____

Problem 1

Calculate the correct performance metric (η, β or β') for a device that requires a power input of 500 [kW] and supplies 1,250 [kW] of thermal energy to a high-temperature reservoir while removing 750 [kW] of thermal energy from the low-temperature reservoir.

Problem 2

Do the following systems violate the 2nd Law of Thermodynamics (yes or no):

(a) A system that transfers heat from a low-temperature to a high-temperature reservoir while simultaneously producing power: _____

(b) A system that takes heat from a high-temperature reservoir, produces power, but does not reject heat to a low-temperature reservoir: _____

(c) A system where a heat engine takes heat from a high-temperature reservoir, produces work while rejecting heat from a low-temperature reservoir, and said work is used to run a refrigerator that takes heat from a low-temperature reservoir and transfers it to a high-temperature reservoir: _____

Problem 3

Using your tables, determine the change of enthalpy for the following:

(a) Carbon dioxide heated from 200 [K] to 2,000 [K]

(b) Liquid water at 2,500 [kPa] heated from 20 °C to 105 °C