Name:

Grade:

Due Date: 22/12/2021 (Due at the time of class)

Solve the following problems. Clearly justify all your assumptions.

Problem 1: In a steam power plant, the outlet steam from the steam generator is superheated to the pressure and temperature of 20,000 kPa and 550°C, respectively. The condenser outlet flow is saturated liquid at the pressure of 25 kPa. Determine the specific heat transfers in the steam generator and the condenser, the specific work involved in the turbine and the pump, and the thermal efficiency of the cycle. Also, if the power plant produces 750 MW (net power output), determine the mass flow rate of the cycle's working fluid.

Solve for the following cases and compare your your results.
  (a) Pump and turbine are both isentropic
  (b) Pump and turbine both have isentropic efficiency of 85%.
  (c) The condenser pressure is now the last 2 digits of your CMS ID with units of kPa and pump & turbine are both isentropic (For example: A student with CMS ID 30387 has to solve for a condenser pressure of 87 kPa).

Problem 2: Briefly answer the following questions.
  (a) Explain the effects of increasing steam generator pressure on the performance of a steam cycle.
  (b) State the difference between reheat and regenerative Rankine cycle.
  (c) Why in a regenerative Rankine cycle are there two pumps?