

ME/CH EN 2300
Homework #11
Due April 4, 2007

#1 (2-75) Water is pumped from a lake to a storage tank 20 m above at a rate of 70 L/s while consuming 20.4 kW of electric power. Disregarding any frictional losses in the pipes and any changes in the kinetic energy, determine (a) the overall efficiency of the pump-motor unit and (b) the pressure difference between the inlet and exit of the pump.

#2 (3-36) Ten kilograms of R-134a fill a 1.595 m³ weighted piston cylinder device at a temperature of -26.4 C. The container is now heated until the temperature is 100 C. Determine the final volume of the R-134a.

#3. (4-74) Argon is compressed in a polytropic process with $n=1.2$ from 120 kPa and 30 C to 1200 kPa in a piston-cylinder device. Determine the work produced and heat transferred during this compression process in kJ/kg.

#4 (4-60) Calculate the change in enthalpy of argon, in kJ/kg, when it is cooled from 400 C to 100C. If neon had undergone this same change of temperature, would its enthalpy change have been any different?

#5 (5-119) Refrigerant 134a enters the condenser of a refrigerator at 1200 kPa and 80 C, and leaves as a saturated liquid at the same pressure. Determine the heat transfer from the refrigerant per unit mass.

#6 (5-123) An insulated rigid tank is initially evacuated. A valve is opened, and atmospheric air at 95 kPa and 17 C enters the tank until the pressure in the tank reaches 95 kPa, at which point the valve is closed. Determine the final temperature of the air in the tank. Assume constant specific heats.