※ 考生請注意：本試題 ☑可 ☐不可 使用計算機

Problem 1 (15%)

A man is cooking mutton for his family in a boiler which is (a) uncovered (b) covered with a light lid (c) covered with a heavy lid. For which case will the cooking time be the shortest? Why?

Problem 2 (20%)

Calculate the specific volume of propane at a pressure of 7 MPa and a temperature of 150°C, and compare this with the specific volume given by the ideal-gas equation of state. (T_C= 369.8 K ，P_C= 4.25 MPa and R=0.18855kJ/kgK)

Problem 3 (20%)

An insulated, rigid tank contains 4 Kg of air at 450 KPa and 30 °C. A valve is now opened and air is allowed to escape until the pressure inside drops to 150 KPa. Assuming that the air inside the tank has undergone a reversible, adiabatic process, please determine the final mass and the final temperature in the tank.

Problem 4 (15%)

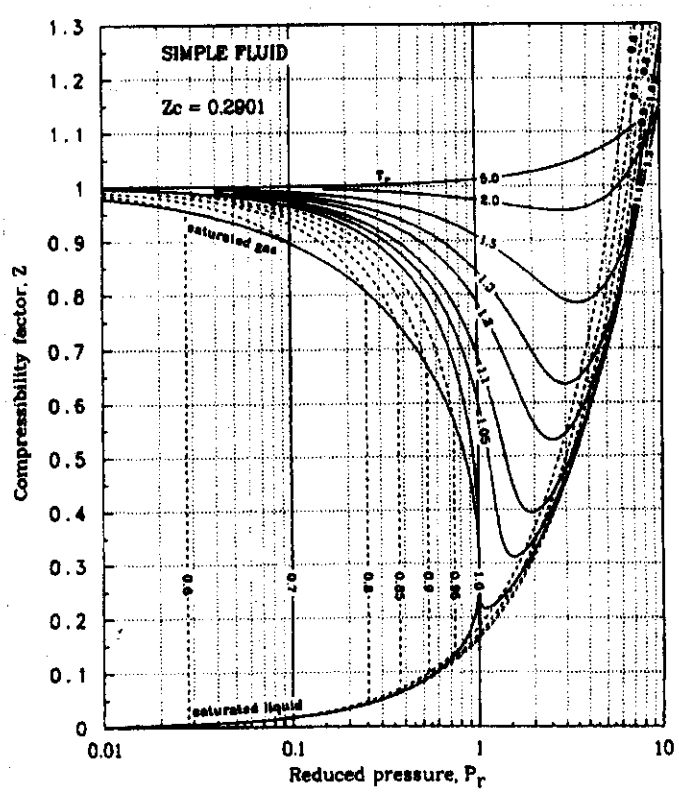
A tank containing a fluid is stirred by a paddle wheel. The work input to the paddle wheel is 5090 kJ. The heat transfer from the tank is 1500 kJ. Consider the tank and the fluid inside a control surface and determine the change in internal energy of this control mass.

Problem 5 (30%)

The mass rate of the flow into a steam turbine is 1.5kg/s, and the heat transfer from the turbine is 8.5 kW. The following data are known for the steam entering and leaving the turbine. Determine the power output of the turbine. (h_{inlet} = 3137.0 kJ/kg ，h_{exit} = 2675.5 kJ/kg，g = 9.8 m/s^2，SSSF condition)

	Inlet Condition	Exit Condition
Pressure	2.0 MPa	0.1 MPa
Temperature	350°C	
Quality		100%
Velocity	50 m/s	100 m/s
Elevation above reference plane	6 m	3 m

g = 9.8066 m/s^2



Lee-Kesler Simple Fluid Compressibility Factor