Assigned 10/4/13

10.4.1
The inlet water of an adiabatic turbine inlet is at 2.5 MPa and is saturated vapor. At the outlet the pressures is 0.15 MPa with a quality of 98%. What is the turbine output power if the mass flow rate is 72 kg/s?
Ans 1.10×10^4 IW

10.4.2
A turbine takes in steam 3 lbm/sec with the inlet at 300 psia, 800°F and a velocity of 180 ft/s. At the outlet the conditions are 14.7 psia, quality of 98% and velocity of 450 ft/s. Knowing the changed in elevation between the inlet and outlet is 3 ft and that the turbine losses heat at the rate of 1.7×10^5 Btu/h what is a) the power output of the turbine. b) the power output if the kinetic and potential energy is neglected c) the diameters of the inlet and outlet pipes?
Ans: a) 813 Btu/s, b) 823 Btu/s, c) 2.73 in and 5.66 in.

10.4.3 Steam is expanded in an adiabatic nozzle. Determine the exit velocity if the inlet is a 2 MPa, 450°C and the velocity is almost zero. The exit pressure is 0.15 MPa and temperature is 150°C.
Ans 1080 m/s