Mer231 – Thermodynamics I
Study Guide for Final Exam

Properties: What is u, h, v, s? When do you use tables to find these properties? When does the ideal gas model apply? How do you find properties of a compressed liquid? How do you interpolate in the tables? How do you determine the state of a substance? How are properties of solids and liquids calculated? What is specific heat? How is it related to enthalpy and internal energy for pure substances? And for ideal gases specifically? How do these properties vary with pressure and temperature?

Processes: How do you identify the following processes: isobaric, isochoric, reversible, isentropic, adiabatic, polytropic, isothermal. What information do you get from identifying these process types? Can you draw all of these processes on a T-s, T-v and P-s diagram? Why are work and heat path functions? What is the difference between a path function and a property?

Conservation of Mass: What is the difference between mass flow rate and volumetric flow rate? How do I find inflow/outflow rates? What does it mean if the process is unsteady?

Conservation of Energy: How is the 1st law of thermo applied to systems and control volumes? What is the difference between a SSSF and a USUF process? Can you solve these sorts of problems? What is the procedure for solving these sorts of problems? What is the function of a turbine, a pump, a nozzle, a valve?

2nd Law of Thermo: What do we use the 2nd law of thermo for? What is a thermal energy reservoir? What is the thermal efficiency and how is it defined for different cycles? What is the difference between the Kelvin-Planck Statement and the Clausius statement? Can you prove the equivalence of the two statements? Can you tell if a given cycle violates one or the other? What sort of things cause irreversibility in a process? What is the ideal cycle? How is the efficiency of an ideal cycle defined? What are the processes that make up the ideal cycle? Can you sketch them on a P-v and T-s Diagram and identify each?

Entropy: What is entropy? How do you use the increase in entropy principle? How is entropy used to help define states for an isentropic process? When is a process isentropic? How is entropy used to help define states for an irreversible process?

Cycles: Know the basics of the Rankine, Otto and Diesel cycles.

Some (but perhaps not all) things I expect you know (i.e. for the closed portion of the test)
- The definition of the thermal efficiency = energy sought/energy cost for heat engines and refrigerators (heat pumps)
- Carnot Efficiency (as a function of the temperatures)
- General statement of the 2nd Law
- General statement of the 1st Law
- Ideal Gas Law
- How to calculate the forces acting on a piston
- The definition of moving boundary work
- Conservation of mass equation
- How to draw P-v and T-s and T-v diagrams