PHYS 1220-02 Group Work Sheet
Heat engines

1. A Carnot engine operates at the thermodynamic limit of efficiency for a heat engine. But no real machine anywhere is powered by a Carnot engine. For some reason, a Carnot engine isn't practical.

   The four steps of a Carnot cycle are 1. Isothermal expansion at T_h 2. Adiabatic expansion from T_H to T_c 3. Isothermal compression at T_C 4. Adiabatic compression from T_c to T_h. Which step or steps cannot be run optimally efficiently in practice, and why?

2. One of your Mastering Physics homework questions for this week claims "The heat coming out the hot side of a heat pump Q_h or the heat going in to the cold side Q_c of a refrigerator is more than the work put in." Is this strictly true?

   a. Under what circumstances is $Q_h > W$ for a heat pump operating at thermodynamic maximum performance?

   b. Under what circumstances is $Q_c > W$ for a refrigerator operating at thermodynamic maximum performance?