1. Petty Problem 5.10 [10 pts]
2. Petty Problem 5.12 [10 pts]
3. Petty Problem 7.4 [10 pts]
4. Petty Problem 7.9 [15 pts]

5. Tropical cyclone as a Carnot cycle
Professor Kerry Emanuel has developed a simple model of a tropical cyclone in terms of a Carnot cycle operating between a high temperature at the sea surface and a low temperature in the upper troposphere.
a. If the sea surface is at temperature of 30°C, and the upper troposphere is at a temperature of -70°C, what is the upper limit on the efficiency of the tropical cyclone? [3 pts]
b. Suppose evaporation, E, at the sea surface surface provides the heat input into the tropical cyclone. If the evaporation is expressed in units of kg s⁻¹, what is the maximum rate at which the tropical cyclone does work? [2 pts]

6. Temperature along a constant mixing ratio curve [5 pts]
Consider a constant saturation mixing ratio curve. What is the slope of temperature with respect to pressure, \(\frac{dT}{dp}\), along such a curve?