Review concepts and questions for Exam 1

Reading: Introduction to Weather and Climate by J. Martin, pages 1-24, 28-29

Basic concepts

1) Composition of atmosphere
2) Structure of atmosphere
3) What is energy, various forms
4) Temperature and temperature scales
5) What is heat, mechanisms for heat transport
6) Radiation, solar (shortwave) and terrestrial (longwave)
7) Blackbody radiation
8) Wien's Law, Stefan-Boltzmann Law, **Kirchoff's Law**
9) **Absorption and Emission**
10) **"Greenhouse" gases**
11) **Reflection and scattering**
12) What do satellite images show (specifically, visible *vs*. infrared)?
13) Factors controlling diurnal cycle
14) Reading a station model
15) Reading model guidance (MOS)
16) **Latent and sensible heat**

Questions to consider

1) How much radiant energy in W m^{-2} is emitted from your body? What is the total radiant energy emitted by your body in Watts? At what wavelength is this radiant energy emitted? What type of radiation is this?
2) Under what conditions would you expect the lowest early morning temperature to occur?
3) Under what conditions would you expect the highest late afternoon temperature to occur?
4) Consider two planets, A and B. Suppose that Planet A is exactly twice the size (surface area) as Planet B. If both Planets have the same surface temperature (1500K), which planet would be emitting the most radiation? Determine the wavelength of the maximum energy emission of both planets using Wien's Law.
5) Why does the surface temperature often increase on a clear, calm night as a low cloud moves overhead?
6) Suppose that the temperature rises from 30^{o}F to 60^{o}F Why is it ***inappropriate*** to say that the temperature doubled?
7) Often when you approach a bridge, you'll see signs saying something to the effect "Caution: bridge freezes before roads." Why is this?