1) The Earth is continually receiving radiation from the sun. Why doesn’t its temperature increase?

2) What are the consequences of decreasing the amount of ozone in the stratosphere?

3) Discuss what happens to solar radiation in passing through the atmosphere from the “top” of the atmosphere to the ground.
4) Calculate the temperature of a red-hot iron bar that has its energy wavelength maximum at 0.65\(\mu\)m. Calculate the rate of emission of energy from the iron bar (\(b = 2900\mu\)m K and \(\sigma = 8.13 \times 10^{-11} \text{cal cm}^{-2} \text{K}^{-4} \text{min}^{-1}\)).

5) The following equation relates the distance from a perfect radiator to the intensity of the radiation that distance.

\[
\frac{E_2}{E_1} = \frac{d_1^2}{d_2^2}
\]

Where \(E_1\) is the energy flux at distance \(d_1\), and \(E_2\) is the energy flux at distance \(d_2\).

The solar constant is 1.959 ly min\(^{-1}\) (1ly = 1 cal cm\(^{-2}\)). The radius of the surface of the sun is 6.95\(\times 10^5\)km and the mean distance from the sun to the earth is 149.6\(\times 10^6\)km.

a) Calculate the energy emitted per unit surface area from the sun’s surface.

b) Calculate the surface temperature of the sun.
6) Compute the temperature the earth would have in the absence of the atmosphere in order to emit exactly the amount of radiation received, on average, from the sun. Use 1.959 ly min\(^{-1}\) for the solar constant and 6370 km for the radius of the earth. (Radiation received is that intercepted by the cross section of the earth, \((1.959\pi R^2)\), but the radiation emitted comes from the earth’s entire surface, \((4\pi R^2)\).)

7) How do chlorofluorocarbons destroy stratospheric ozone and why is the ozone hole greatest over Antarctica in the months of September and October?

8) What is the Noon Sun angle at 30\(^\circ\)S latitude on the northern hemisphere summer solstice, winter solstice and equinox?