1. Venus and Mars
   a. Compute the solar flux in Watts per square meter for Venus and Mars. You may assume that the orbit of Venus is at a distance of \(1.08 \times 10^{11}\) meters from the Sun while Mars is at a distance of \(2.28 \times 10^{11}\) meters.
   b. Assume that Venus and Mars are replaced in their orbits by perfect black bodies. What would their surface temperatures be?
   c. Assume that Venus is replaced by an otherwise perfect black body, but with an albedo of 0.71. What would the surface temperature be? The actual albedo of Venus is about 0.71, and the surface temperature is approximately 737K. Discuss any discrepancy between this value and your computed value.
   d. Assume that Mars is replaced by an otherwise perfect black body, but with an albedo of 0.17. What would the surface temperature be? The actual albedo of Mars is about 0.17, and the surface temperature is approximately 213K. Discuss any discrepancy between this value and your computed value.

2. Work Exercise 8, Section 2.9 from the textbook (repeated here for your convenience).

   8. Satellite data of the Sun’s radiation indicate that the solar constant \(S_0\) varies approximately between 1,365.5 Wm\(^{-2}\) and 1,367 Wm\(^{-2}\), with a period of about 11 years.

   (i) Use the balance equation (2.8) with \(\alpha = 0.3\) and \(\varepsilon = 0.6\) to estimate the resulting variation (difference of max and min) in the Earth’s global mean surface temperature \(T\). Use a suitable linearization if possible.

   (ii) Use the balance equation (2.14),

   \[(1 - \alpha)Q = A + BT,\]  

   with \(A = 203.3\) and \(B = 2.09\) to estimate the resulting variation (difference of max and min) in the surface temperature \(T\). Use \(\alpha = 0.3\).

   (iii) Explain (conceptually, without formulas) why the actual variation in surface temperature would be less than what you computed above. Hint: Think of the heat capacity of the oceans.