1. I&D 12.11

2. Spherical aluminum shell of inside diameter 2m is evacuated and used as a radiation test chamber.

   a. If the inner surface is coated with carbon black ($\epsilon = 1$) and maintained at 600K, what is the irradiation, $G$, on a small black test surface placed in the chamber? At thermal equilibrium, what is the radiosity, $J$, of the test surface?

   b. Repeat Part (a) for the case in which the inside surface of the aluminum sphere is not coated (for aluminum, $\epsilon = 0.1$).

   c. Repeat Part (a) for the case in which the sphere is coated ($\epsilon = 1$), but the test specimen is gray (for the test specimen, $\epsilon = 0.8$).

   d. If, in Part (c), the initial temperature of the test specimen is 300K, what is the initial net rate at which the specimen receives heat from the surroundings? Express your answer in W/m$^2$.

Stefan-Boltzmann Constant = $5.670 \times 10^{-8}$ W/m$^2 \cdot$ K$^4$. 