1. The following questions consider the possibility of using decay heat from $^{238}\text{Pu}$.

   (a) Calculate the specific thermal energy content of a sample of pure $^{238}\text{Pu}$, that is, calculate the power in Watts given off by the alpha decay per kg of pure material.

   (b) Calculate the mass in grams of $^{238}\text{Pu}$ that would be needed to generate 470 W of thermal power in a radioisotope thermal generator (RTG) to be used on a spacecraft.

   (c) Unfortunately the conversion of thermal power to electrical power is rather inefficient, approximately 7% in most real devices. Calculate the mass in grams of $^{238}\text{Pu}$ needed to generate 470 W of electrical power for the spacecraft.

2. Calculate the classical turning point or distance of closest approach for an alpha particle at an energy of 5.4 MeV to a $^{234}\text{U}$ nucleus. This is the radial distance, $r$, at which the kinetic energy of the alpha particle is equal to the Coulomb potential energy ($V_C = Z_1 Z_2 e^2 / 4\pi\epsilon_0 r$).

3. What is the ratio of the classical turning point calculated above to the radius of a $^{234}\text{U}$ nucleus?