PHY 251 Fall 2009: homework problem set 11, due in the PHY 251 drop box in room A-129 by noon on Friday, Dec. 11.

1. Serway 14.3
2. Serway 14.7
3. Serway 14.8
4. Serway 14.22
5. Serway 14.24
6. Serway 14.28
7. Serway 14.30
8. Serway 14.35
9. Serway 14.37
10. ^{239}Pu alpha decays with a half-life of 2.41×10^4 years. Calculate the energy of the alpha particle, or if you can't, assume that it is 10 MeV. Compute the power output, in watts, which could be obtained (at 100% efficiency) from 1.0 kg of "fresh" ^{239}Pu. *Thermal power sources like this have been used to power some craft launched to deep space where sunlight is weak; a recent example is the Cassini probe to Saturn (the team is led by a woman who earned her B.A. in Astronomy at Stony Brook).*
11. Let's assume that you are at Times Square on New Year's Eve and a terrorist releases some finely ground powder of ^{239}Pu into the air. You inhale one 0.1 μg particle which becomes permanently lodged in your lungs. Let's assume that the alpha particles created by its decay deposit 50% of their energy within a distance of 10^{-2} cm in tissue. Assume that the tissue has the density of water.
    A) What is the radiation dose in Gray received by this tissue over the course of a week?
    B) What can you say about how large a dose this is?