Week 6 Assignment: (20 points)

1. In your own words, describe what is occurring during the process of electron beta decay, explaining what is ejected from the unstable nucleus and focusing subatomic changes. (2 points for clear and accurate description).

   Beta particles are electrons or positrons. Beta decay occurs, in a nucleus with too many protons or too many neutrons, one of the protons or neutrons is transformed into the other. Electric charge conservation requires that if an electrically neutral neutron becomes a positively charged proton, an electrically negative particle must also be produced.

2. Write balanced chemical reactions for the following: (1 point each, 4 points total)
   a. Cobolt-60 undergoes beta decay 60/27 Co -> 0/-1 beta + 60/28 Ni
   b. Americium-241 undergoes alpha decay 241/95 Am -> 4/2 alpha + 237/93 Np
   c. Copper-60 undergoes positron emission 60/29 Cu -> 0/1 beta + 60/28 Ni
   d. Gallium-66 undergoes electron capture 66/31 Ga -> 0/-1 beta + 66/32 Ge
3. Strontium-89 is an isotope used in the treatment of bone cancer and has a half-life of 50.57 days. If 20 grams of this isotope is injected into a patient, how much will remain after 354 days? (1 point for correct answer with all work shown).

   354/50.57 = 7.00019775 then 20grams (0.5^ 7.00019775) = **0.154 grams**

4. An isotope has a half-life of 45 minutes. What % of a sample of this isotope will remain after 1.5 hours, assuming that we start with 100%? (1 point for correct answer with all work shown).

   1.5 hours X 60 minutes/ 1 hour = 90 minutes

   90 minutes / 45 minutes = 2 half-lives then 100(0.5^2) = **25%**

5. Compare and contrast a source of ionizing energy with a source of non-ionizing energy. (1 point)
   Non-ionizing radiation is longer wave lengths with lower frequency and lower energy. Ionizing radiation is short wave lengths with high frequency and higher energy.