ESP
Kouba
Worksheet 5 1/2

1.) A small herd of wild hogs in the Appalachian Mountains grows at a rate proportional to the number of hogs present at time t. After 2 years there are 100 hogs and after 6 years there are 400 hogs in the herd.
    a.) How many hogs were there initially ?
    b.) How many hogs will there be after 10 years ?

2.) Assume that the blood level amount of alcohol (percentage of 1% by volume) decreases exponentially. Initially, the blood level is 0.17 and after one hour the blood level is 0.13. In how many hours will the blood level be 0.08, the threshold for legal intoxication ?

3.) If the amount of a radioactive substance decreases from 9 mg to 5 mg in 36 weeks, how long does it take for 20% of the substance to disintegrate ?

4.) The population of Wendy, Wyoming, was 325 in 1875 and 117 in 2003. Assuming exponential growth,
    a.) what is the expected population of Wendy in 2100 ?
    b.) what was the estimated population of Wendy in 1700 ?

5.) Corn silage contains 7 times the allowable amount of iodine 31. The half-life of iodine 31 is 8 days. In how many days will the amount of iodine 31 reach a safe, allowable level ?

6.) A bacterial culture grows at a rate proportional to the amount present. If the weight of the culture increases by 40% in the first 5 hours, how long does it take for the weight to triple ?

7.) According to one cosmological theory, there were equal amounts of two uranium isotopes U^{235} and U^{238} at the creation of the universe in the "big bang." At present there are 137.7 atoms of U^{238} for each atom of U^{235}. Using the half-lives of 4.51 billion years for U^{238} and 0.71 billion years for U^{235}, calculate the age of the universe.