## **HW - APPLICATIONS DAY 2**

If you start with one gram of a certain isotope, you have 0.9 grams after a week.

a) What is the half life of this isotope?

Vital is the nair life of this isoto

$$0.9 = 1(\frac{1}{4})^{\frac{7}{4}}$$
 $0.9 = (\frac{1}{4})^{\frac{7}{4}}$ 
 $10.9 = \frac{1}{4}$ 
 $10.9 = \frac{1}{4}$ 

b) How much is left after a year? 365 days

x (.15a)= 7 X= 7/152

x~46 days

c) How long will it be until there is 
$$\frac{1}{10}$$
 gram left?  
 $\frac{1}{10} = (\frac{1}{4})^{\frac{1}{40.05}}$  3.  $32.93 = \frac{x}{46.05}$   
 $\frac{1}{10} = \frac{1}{10} = \frac{x}{46.05}$   
 $\frac{1}{10} = \frac{x}{46.05}$ 

2. The bacteria Escherichi coli are commonly found in the bladder of human beings. Suppose that 3000 of the bacteria are present at time t = 0. If the amount of bacteria doubles every 20 minutes, find the following:

Find a formula representing the number of bacteria after t minutes.

b) How many bacteria will be present after 10 minutes? 20 minutes? 2 hours?

10 mins: 3000(2) 100 + 4243

30 mins: 3000(2) 3%0 = 8,485 | 2 hrs: 3000(2) 300 |

c) When will 1,000,000 bacteria be present?  $1,000,000 = 3,000(2)^{3/20}$ 

$$1000 = 3,000(2)^{72}$$
 $1000 = 2^{t/20}$ 
 $1000 = t/20$ 

78.38082=t/20

t = 167.6 mins or ~2 hrs & 48 mins

3. Suppose you start with 100 grams of a radioactive substance which has a half-life of 25 days.

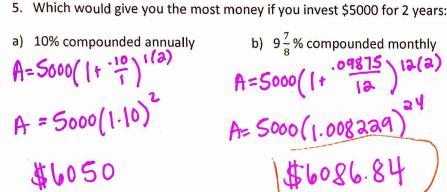
a) How many grams are left after 40 days?

b) How long will it take until there are 5 grams left?

4. The annual interest rate on a \$100,000 loan is 10%. Assuming no principle is paid, how long does it take to build up the interest charge to over \$60,000 if it is compounded annually? Monthly? Continuously? (The interest charge is the amount you pay for borrowing the loan money in the first place)

ANNUALLY: 100,000 = 100,000 (1+ ·10) 1.6=1.1=

(00,000 = 100,000 (1+ .10) 13 b 1.6= 1.008333 12t 1.6=12t



b) 
$$9\frac{7}{8}\%$$
 compounded monthly
$$A = 5000(1 + \frac{09875}{12}) 12(2)$$

$$A = 5000(1.008229)$$

$$$6086.84$$

c) 
$$9\frac{3}{4}$$
 compounded continuously (.0915)(2)  
 $A = 5000e$   
 $A = 5000e$   
\$6076.55

6. This year an estimated 4,324,000 people in this country are illiterate. With new incentives and funding, the country is hoping to cut that number by 11% every 3 years. How many people do you predict will be illiterate in the year . . .

7. A cup of coffee contains approximately 96 mg of caffeine. When you drink the coffee, the caffeine is absorbed into the bloodstream and is eventually metabolized by the body. Every 5 hours the amount of caffeine present in the body is reduced by one-half. How many hours does it take for the amount of caffeine to be reduced to 12 mg?

8. Sodium-24 has a half-life of 15 hours. How much sodium-24 will you have after 60 hours if your original sample is 64 mg? y=64(1/2) 1915

9. Find the amount in an account after 15 years if \$5000 was initially invested and the account earns 8% annual interest compounded quarterly.

10. Find the length of time needed to earn \$124.49 if Megan invests \$957.62 at 6.5% interest, compounded \$ this is her INTEREST ... "A" is total & accumulated continuously.