MATH 100 Class Session 11/10/2008

1. Simplify each of the following expressions.

   a. $\ln(e^{23}) + \ln(e^{15})$

   b. $\ln(e^{38})$

   c. $\ln(7^{10}) - \ln(7^{3})$

   d. $\ln(7^{4})$

   e. $\ln(5^{-2})$

   e. $\ln(\frac{1}{25})$

2. *Calculating Doubling Time & Half-Life*
   Solve for x:

   a. $2000 = 1000(e^{0.06x})$

   b. $2000 = 1000(1.06)^{x}$

   c. $500 = 1000(e^{-0.06x})$

   d. $0.5 = (0.80)^{x}$

3. If we look in Wikipedia, the free encyclopedia for a definition of half-life we obtain the following definition.

> The **half-life** of a quantity whose value decreases with time is the interval required for the quantity to decay to half of its initial value. The concept originated in the study of radioactive decay which is subject to exponential decay but applies to all phenomena including those which are described by non-exponential decays.

Carbon dating is used to find the age of fossils, bones, and other items. The formula used is

$$P = P_0 2^{\frac{-t}{5715}},$$

Where P_0 represents the original amount of carbon 14 (C_{14}) present and P represents the amount of C_{14} present after t years. If 10 mg of C_{14} is present in an animal bone recently excavated, how many mg will be present in 5000 years? How long will it take for only 5 mg of C_{14} to be present in the bone?

4. Examine the ratios of successive terms for the following exponential functions.

x	$f(x) = 10(1.5)^x$	f(x)/f(x-1)

x	$f(x) = 10(0.8)^x$	f(x)/f(x-1)

5. Find rules for functions whose rules produce the values in the tables below.
6.

x	f(x) =	f(x)/f(x-1)
0	100	
1	140	
2	196	
3	274.4	
4	384.16	

x	f(x) =	f(x)/f(x-1)
0	100	
1	40	
2	16	
3	2.56	
4	1.024	

6. What sort of function might capture the pattern of Florida's population growth during 1990-1999?

Δt	Year	Years Since 1990 t	Florida's Population (millions) P(t)	ΔP(t)	Ratio P(t)/P(t-1)				
	1990	**0**	**12.94**						
	1991	**1**	**13.32**						
	1992	**2**	**13.70**						
	1993	**3**	**14.10**						
	1994	**4**	**14.51**						
	1995	**5**	**14.93**						
	1996	**6**	**15.36**						
	1997	**7**	**15.81**						
	1998	**8**	**16.27**						
	1999	**9**	**16.74**						
	2000	**10**