

HOMEWORK SET 2

MAT 122 · FALL 2008

You must show all work to get full credit. You can use a calculator to check your work.

Problem 1. Write the following expressions as the logarithm of a single expression.

- (a) $\log x - \log 4 + \log y$.
- (b) $\log x - (\log 4 + \log z)$
- (c) $\frac{1}{2} \log x^4 - \frac{1}{2} \log y^5$
- (d) $2 \log_5 x + 3 \log_5 y - \log_5 z$

Problem 2. The radioactive isotope of hydrogen decays according to the formula,

$$A = A_0 \left(\frac{19}{20} \right)^t,$$

where A_0 is the original amount and t is measured in years. If we have a 5-gram sample, how much should we have after 4 years. Round your answer to the nearest hundredth of a gram.

Problem 3. You plan to put \$1500 in a certificate of deposit that pays 5.5% interest and is compounded monthly. How much money will you have at the end of 2 years?

Problem 4. The *1997 Information Please Almanac* provides the resident population of the US. The function $P(t) = 80e^{0.013t}$ describes the population growth from 1900-1990 where t is the number of years since 1900 and $P(t)$ is the population in millions of people. Use the function to predict the number of people in the US the year 2000.

Problem 5. Write the inverse function for $f(x) = 3^x$.

Problem 6. Doubling time for exponential growth can be calculated by using the function $t_D = \frac{\ln 2}{k}$, where t is the doubling time and k is the fractional growth rate. If the number of people who have contracted a strain of the flu doubles every 15 days, what would the growth rate be? Round your answer to the nearest thousandth.