University of South Carolina
Math 111: College Algebra
Instructor: Austin Mohr
Section 8
Fall 2008

Test 2
(200 points total)

[20] 1. For parts a and b, express you answer using scientific notation.

a. The length of a really small ruler is approximately 84 000 nanometers (recall that 1 nanometer = 10^{-9} meters). Convert the length of the diameter to meters.

b. Suppose $3 * 10^9$ of these tiny rulers are lined up end-to-end. How long is this line in meters?

[20] 2. Recall that 1 inch = 2.54 centimeters. How many inches are in 7.25 kilometers?

[30] 3. Write in simplest terms. Your answer should not contain negative exponents or radicals.

a. $\left(\frac{-3x^4y^4}{x^3y}\right)^2$

b. $\frac{x^{-2}y^3z^{-1}}{(xy^{-1})^{-2}z^3}$

c. $\sqrt{16x^2y^2}\sqrt[3]{27x^4y^7}$

[20] 4. Evaluate the expression or solve for x, as appropriate. Do not use decimal approximations.

a. $log(100)$

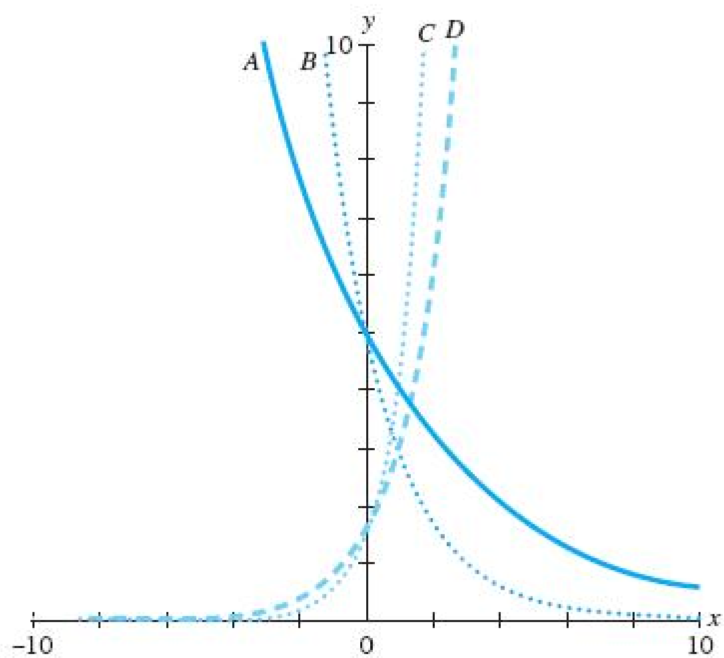
b. $log(.01)$

c. $log(x) = 3$

d. $10^{3x-1} = 6$

[20] 5. Match each graph with the appropriate function.

$f(x) = 1.5 * 2^x$, Graph ____
$g(x) = 1.5 * 3^x$, Graph ____
$h(x) = 5 * 0.6^x$, Graph ____
$i(x) = 5 * 0.8^x$, Graph ____



[30] 6. The population of a small town was 2,000 in 1900. By 2000, the population had grown to 50,000. Construct an exponential function $f(t)$ to model the population growth, where t denotes the number of 10-year periods since 1900. Do not use decimal approximations.

[30] 7. At the close of the 2006 fiscal year, a company netted $4 million in profit. Over the course of the following year, profits increased by 150%.

a. Assuming profits continue to increase at this rate, construct an exponential function $f(t)$ that models the growth, where t denotes the number of years since 2006 and $f(t)$ denotes millions of dollars profit.

b. Use the function in part (a) to estimate the company's profits at the close of the 2011 fiscal year.

[30] 8. An unknown quantity of a chemical is present at the beginning of a reaction. Three minutes after the reaction begins, 50 mg of the chemical remain. Seven minutes after the reaction begins, 20 mg of the chemical are remain.

a. Construct an exponential function $f(t)$ to model the decay where t denotes the number of minutes since the beginning of the reaction.

b. Using the function in part (a), determine the time at which 2 mg of the chemical will remain.