

Exam 3

Chapter 4 Exponential and Logarithmic Functions

Please show all your work in the space provided for each question.

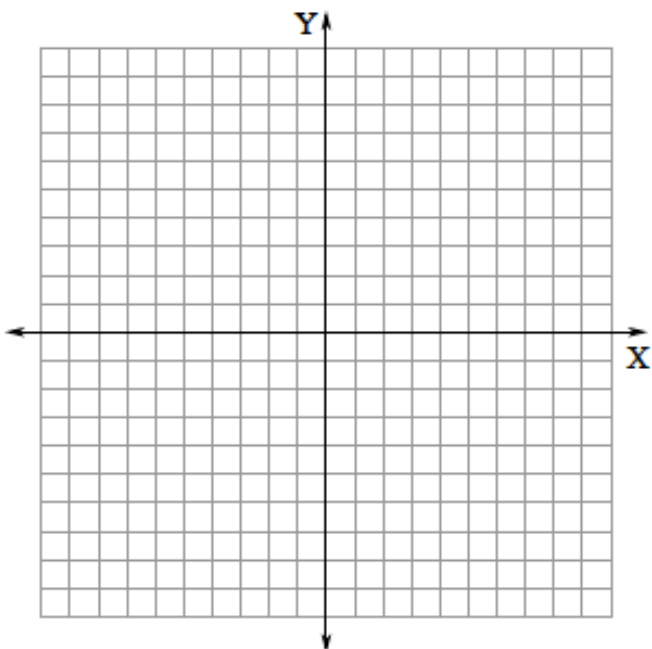
1. Determine the inverse, if it exists, of the function $f(x) = \frac{x+5}{4}$. 1. _____

2. Find the inverse of the one-to-one function $f(x) = 3x^5 + 1$. 2. _____

3. Use the function defined by $f(x) = \sqrt{x-4}$. Use interval notation.
a. What is the domain of f ? 3a. _____

b. What is the range of f ? 3b. _____

4. Graph the function $f(x) = 3^x + 1$. Describe its behavior as $x \rightarrow \pm\infty$. Be sure to label the tick marks. 4. _____



Directions: Use a calculator to find approximations for each of the following. Express answers to the *thousandths* place.

5. $\ln 241$ 5. _____

6. $\log_5 \frac{1}{125}$ 6. _____

7. Solve: $7^{3x} = 49^{4x+5}$ 7. _____

8. Solve: $\ln(2x-1) = 2$ 8. _____

9. Solve: $\log_2 x + \log_2(x-2) = 3$ 9. _____

10. Write in exponential form: $\log_3 \frac{1}{27} = -3$. 10. _____

11. Write in logarithmic form: $16^{1/4} = 2$. 11. _____

12. Write the following expression as a sum or difference of logarithmic expressions. Eliminate exponents and radicals if possible:

$$\log \sqrt{\frac{x^3}{y^2}}$$

13. Write the following expression as a logarithm of a single quantity, and simplify when possible: $\frac{3}{5} \log x + \frac{4}{5} \log y$ 13. _____

Money:

• A principal P invested at an annual rate r compounded n times a year yields the amount A in the account at the end of t years is given by $A = P\left(1 + \frac{r}{n}\right)^{tn}$.

• A principal P invested at an annual rate r compounded continuously yields an amount A in the account at the end of t years is given by $A = Pe^{rt}$.

14. For an initial deposit of \$4,000, find the total amount in a bank account after 8 years if the interest rate is 2% compounded monthly. 14. _____

15. Find the value in five years of an initial investment of \$500 at an interest rate of 3% compounded continuously. 15. _____

16. The magnitude of an earthquake is measured on the Richter scale using the formula $R(I) = \log \frac{I}{I_0}$, where I represents the actual intensity of the earthquake and I_0 is a baseline intensity used for comparisons. If an earthquake registers 5.8 on the Richter scale, express its intensity in terms of I_0 . 16. _____

17. The number of college students infected with a cold virus in a dormitory can be modeled by the logistic function $N(t) = \frac{150}{1 + 2e^{-0.5t}}$, where t is the number of days after the first infection.

a. How many students were initially infected? 17a. _____

b. Approximately how many students will be infected after 10 days? 17b. _____

Decay: A radioactive substance is decaying so that the number of grams present after t days is given by the function $A(t) = 2000e^{-0.02t}$.

18. Find the amount of the substance, to the nearest tenth of a gram, present after 60 days.

18. _____

Before you finish this exam and present it to your proctor, please consider the following questions. If you simply answer “yes” without actually checking, lightning and acne will surely strike!

19. Did you label the intervals on your graph?

19. _____

20. Did you round to the indicated level of precision in your answers?

20. _____