

Math 161
Exponential and Logarithmic Functions Worksheet

Find $(f \circ g)(x)$ and $(g \circ f)(x)$

1. $f(x) = \frac{x^2 - 1}{x - 3}$, $g(x) = 3x + 5$

Determine if the function is one-to-one and if it is find the inverse:

2. $f(x) = 4x^2 + 2$

3. $f(x) = \frac{x + 5}{x - 2}$

Solve:

4. The bacteria commonly found in the human bladder. Suppose that 3000 of the bacteria are present at time $t = 0$. Then under certain conditions, t minutes later, the number of bacteria present is

$$N(t) = 3000(2)^{t/18}.$$

- a) How many bacteria will be present after 10min? 20min? 30min? 50 min?
- b) Graph the function.
- c) At what time will the bacteria number 1,000,000?

Graph the function:

5. $f(x) = 2^x + 2^{-x}$

Solve:

6. $\log_4 64$

Convert to logarithmic equation:

7. $V^t = P$

Convert to exponential equation:

8. $\log_b K = a$

Express in expanded form:

$$9. \log_a \frac{\sqrt[4]{a^6 b^5}}{\sqrt{a^2 b^3}}$$

Express as a single logarithm:

$$10. 5 \ln a + (2 \ln b - \ln(x + y))$$

Solve:

$$11. 5^{x+2} = 3^{1-x}$$

$$12. \log_4(x + 3) + \log_4(x - 2) = 4$$

13. In 1623, Peter Minuit of the Dutch West India Company purchased Manhattan Island from the Native Americans for \$24. Assuming an exponential rate of inflation of 5.4% per year, how much is Manhattan worth this year?

14. The total number of states in the U.S. that have passed mandatory seat belt laws is given by the function below where t is time in years after 1984.

$$N(t) = \frac{50}{1 + 22e^{-0.6t}}$$

- Graph the function.
- How many states have passed the law in 1984?
- Find the number of states that had passed the law between 1992 and 1996.
- According to the function, will all 50 states pass a law?