Unit 6: Exponential and Logarithmic Functions

1. Simplify the following expressions

a) $8^{\log_8 x}$ b) $\log_7 7^{-3x}$

c) $\log_2 64^{x}$ d) $e^{\ln 20}$

2. Find the inverse of the the following exponential and logarithmic functions.

a) $y = 4^{x}$ b) $y = \ln(x - 5)$

3. Let the graph of g be a horizontal stretch by a factor of 3, followed by a translation 2 units up of the graph of $f(x) = e^{-x}$. Write a rule for g.

4. Let the graph of g be a reflection in the y-axis, followed by a translation 4 units to the left of the graph of $f(x) = \log x$. Write a rule for g.

5. Use $\log_6 5 \approx 0.898$ and $\log_6 8 \approx 1.161$ to evaluate the logarithm.

a) $\log_6 \frac{5}{8}$ b) $\log_6 64$

6. Expand the logarithmic expression.

a) $\log_6 3x^4$ b) $\ln \frac{5}{12x}$

7. Condense the logarithmic expression.

a) $\log x - \log 9$ b) $\ln 4 + 3 \ln 3 - \ln 12$

8. Solve the equations.

a) $7^{9x} = 15$ b) $4e^{-0.3x} - 7 = 13$

9. Solve the equation. Check for extraneous solutions. $\log_4(x + 12) + \log_4 x = 3$

Answers

1a. x

1b. -3x

1c. 6x

1d. 20

2a. $y = log\ _4 x$

2b. $y = e^{\,x} + 5$

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

4. $g(x) = log(-x - 4)$ or $g(x) = log(-(x + 4))$

5a. -0.263

5b. 2.322

6a. $log\ _6 3 + 4\ log\ _6 x$

6b. $ln\ 5 - ln\ 12 - ln\ x$

7a. $log \frac{x}{9}$

7b. $ln\ 9$

8a. $x = \frac{log_7 15}{9}$ or $x \approx 0.155$

8b. $x = -\frac{ln(5)}{0.3}$ or $x \approx -5.365$

9. $x = 4$ $\{x = -16$ *is extraneous* $\}$