

Review rules of exponents page 426. Graphing exponential functions and solving equations. Summary page 435.

Page 434 if $a^u = a^v$, then $u = v$.

6.3 Exponential Functions

Practice Problems

Solve each equation.

1. $4^{2x-1} = 64$

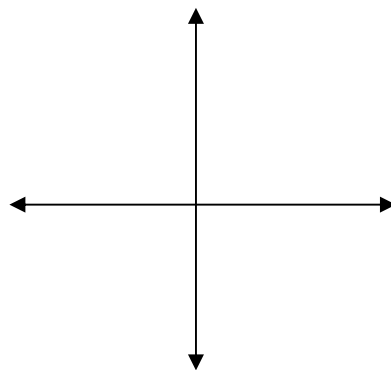
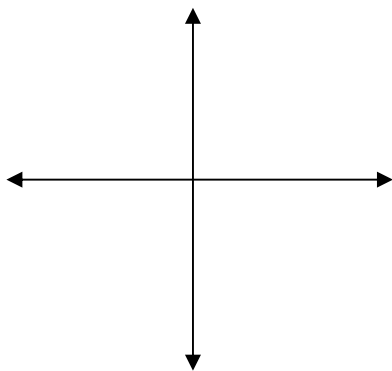
2. $27^{x-3} = 9^{2x-4}$

3. $e^x e^{2x^2} = e^{15}$

4. $9^x - 3^x = 0$

5. Graph $f(x) = 4^{x-2}$.

6. Graph $f(x) = e^{-x} + 3$.



- a. Label two points: _____
- b. Label any asymptotes. _____
- c. Find the domain of $f(x)$. _____
- d. Find the range of $f(x)$. _____
- e. Graph $f^{-1}(x)$ on the same axis.

- a. Label two points: _____
- b. Label any asymptotes. _____
- c. Find the domain of $f(x)$. _____
- d. Find the range of $f(x)$. _____
- e. Graph $f^{-1}(x)$ on the same axis.

Label at least two points on the graph.

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f. What is the equation of $f^{-1}(x)$.

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$f^{-1}(x) =$ _____

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6.4 Logarithmic Functions Recall:

$$y = \log_a x \text{ if and only if } x = a^y$$

This definition illustrates a logarithm is a name for a certain exponent.

Also remember that $\ln x$ is an abbreviation for $\log_e x$ and that $\log x$ means $\log_{10} x$.

Change from logarithmic to exponential form.

Change from exponential to logarithmic form.

1. $\log_4 64 = 3$ _____

4. $6^x = 3$ _____

2. $\ln x = 7$ _____

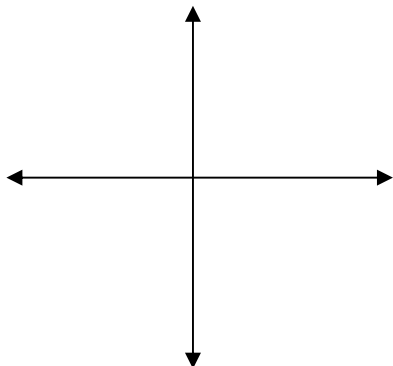
5. $x^2 = 4$ _____

3. $\log 4 = x$ _____

6. $3^2 = x$ _____

Remember that a logarithmic function is the inverse of an exponential function.
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7. Graph $f(x) = \ln(x - 3)$.



a. Label two points: _____

b. Label any asymptotes. _____

c. Find the domain of $f(x)$. _____

d. Find the range of $f(x)$. _____

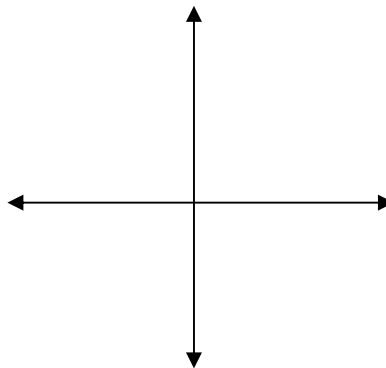
e. Graph $f^{-1}(x)$ on the same axis.

Label at least two points on the graph.

f. What is the equation of $f^{-1}(x)$.

$$f^{-1}(x) = \underline{\hspace{2cm}}$$

8. Graph $f(x) = 2\log_5(-x)$.



a. Label two points: _____

b. Label any asymptotes. _____

c. Find the domain of $f(x)$. _____

d. Find the range of $f(x)$. _____

e. Graph $f^{-1}(x)$ on the same axis.

Label at least two points on the graph.

f. What is the equation of $f^{-1}(x)$.

$$f^{-1}(x) = \underline{\hspace{2cm}}$$

9. Find the **domain** of the following functions.

a. $y = \ln(x - 3)$

b. $y = \log\left(\frac{3x+4}{x}\right)$

Evaluate the following **without a Calculator!**

10. $\log \frac{1}{1000} =$ _____

11. $\ln e^{3x+1} =$ _____

12. $\log_{\frac{1}{4}} 64 =$ _____

13. $2 \log_{81} 9 =$ _____

Solve each equation.

14. $\log_5 625 = 3x - 4$

15. $\log_3(2x - 1) = 4$

16. $e^{3x+1} = 7$

17. $\log_5(x^2 + x + 4) = 2$

6.9 Building Models from Data

The following data from the *U. S. Census Bureau* shows the population of New Hanover County for select years from 1940 ($t = 0$) to 1990 ($t = 50$) in ten thousands.

| Year (t) | Population |
|------------|------------|
| 1940; t=0 | 4.8 |
| 1950; t=10 | 6.3 |
| 1960; t=20 | 7.2 |
| 1970; t=30 | 8.3 |
| 1980; t=40 | 10.3 |
| 1990; t=50 | 12 |



- a. Find the line of best fit to the data (Write the linear function in the form $y = mt + b$ for t in years and y in ten thousands.) and the correlation coefficient.

- b. Find an exponential fit to the same data and find the correlation coefficient.

- c. On the same axes, draw the scatter diagram, graph the best-fit line and best-fit exponential curve. Which of the two models fits better? Explain

- d. Using the model you chose in (c), estimate the population of New Hanover County in the year 2005.
