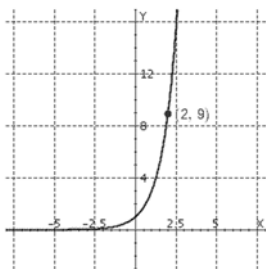
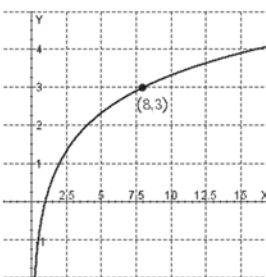


1. Find the exponential function  $f(x) = a^x$  whose graph is given.



- a.  $f(x) = 3^x$       b.  $f(x) = 3^{x+3}$   
 c.  $f(x) = -3^x$       d.  $f(x) = 3^{-x}$   
 e.  $f(x) = x^3$
2. State the range of the function.  $h(x) = 2 + \left(\frac{1}{7}\right)^x$
- a.  $(0, \infty)$       b.  $(-2, \infty)$       c.  $(-\infty, \infty)$   
 d.  $(2, \infty)$       e.  $(-2, 2)$
3. State the range of the function  $y = 8 - e^x$ .
- a.  $(-8, \infty)$       b.  $(-\infty, 8)$       c.  $(-\infty, \infty)$   
 d.  $[8, \infty)$       e.  $(0, \infty)$
4. What is the asymptote of the function  $y = e^{x-2} + 3$ ?
- a.  $x = 2$       b.  $y = 3$       c.  $y < 3$   
 d.  $y = 2$       e.  $x > 2$
5. Solve for  $x$ :  $\ln(x+1) = 4$ .
- a.  $x = e^1 - 4$       b.  $x = e^4 - 1$       c.  $x = e^1 + 4$   
 d.  $x = e^4 + 1$       e. none of these
6. Express the equation in logarithmic form.  $3^4 = 81$
- a. none of these      b.  $\log_4 3 = 81$       c.  $\log_3 81 = 4$   
 d.  $\log_4 81 = 3$       e.  $\log_{81} 3 = 4$
7. Evaluate the expression.  $e^{\ln 5}$
- a.  $5e$       b. none of these      c.  $\ln 5$   
 d.  $5$       e.  $e^5$
8. Find the function of the form  $y = \log_a x$  whose graph is given.

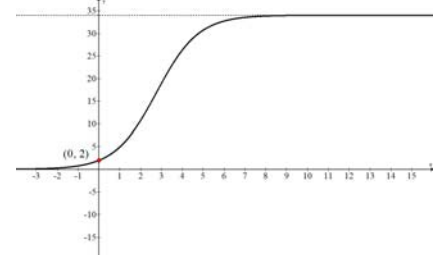
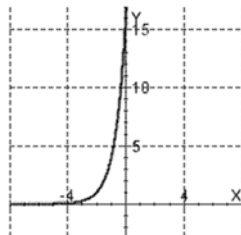
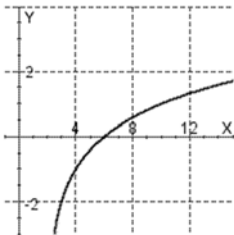


- a.  $y = \log_5 x$       b.  $y = \log_2 x$       c.  $y = \log_8 x$   
 d.  $y = \log_3 x$       e. none of these
9. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.  $\log_a \left( \frac{x^2}{yz^7} \right)$
- a.  $-2 \log_a x + \log_a y + 7 \log_a z$   
 b.  $\frac{2 \log_a x}{\log_a (7y) \log_a z}$   
 c.  $2 \log_a x - \log_a y - 7 \log_a z$   
 d.  $2 \log_a x + \log_a y + 7 \log_a z$   
 e.  $2 \log_a x - \log_a y + 7 \log_a z$
10. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.  $\ln \left( x \sqrt[9]{\frac{y}{z}} \right)$
- a.  $\ln x + \frac{1}{9} \ln y + \frac{1}{9} \ln z$       b.  $\ln x + \frac{1}{9} \ln y - \frac{1}{9} \ln z$   
 c.  $\ln x - \frac{1}{9} \ln y - \frac{1}{9} \ln z$       d.  $\ln x - \frac{1}{9} \ln y + \frac{1}{9} \ln z$   
 e.  $\frac{1}{9} (\ln x + \ln y - \ln z)$
11. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.  $\log \sqrt[6]{x^6 y^6 z^6}$
- a.  $\frac{1}{216} \log x + \frac{1}{36} \log y + \frac{1}{6} \log z$   
 b.  $\frac{1}{216} (\log x + \log y + \log z)$   
 c.  $\frac{1}{6} \log x + \frac{1}{36} \log y + \frac{1}{216} \log z$   
 d.  $\frac{1}{216} \log x - \frac{1}{36} \log y - \frac{1}{6} \log z$   
 e.  $\frac{1}{6} (\log x + \log y + \log z)$
12. Rewrite the expression as a single logarithm.  $\log_3 2 + 2 \log_3 2$
- a.  $\log_3 8$       b.  $\log_8 3$       c.  $\log_3 4$   
 d.  $1$       e.  $\ln 8$
13. Rewrite the expression below as a single logarithm.  $\log 14 + \frac{1}{2} \log 3 - \log 2$
- a.  $\ln 3 \sqrt{7}$       b.  $\log \frac{1}{3} \sqrt{7}$       c.  $\log \frac{1}{7} \sqrt{3}$   
 d.  $\log 21$       e.  $\log 7 \sqrt{3}$
14. Solve the equation.  $e^{2x} - 5e^x + 4 = 0$
- a.  $x = -4, x = 1$       b.  $x = \ln 5$   
 c.  $x = \ln 5, x = 0$       d.  $x = 4, x = 1$   
 e.  $x = \ln 4, x = 0$

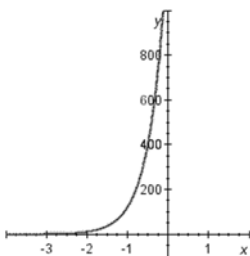
15. Solve the logarithmic equation for  $x$ .  
 $\log(8x+6) = 2$   
 a.  $x = \frac{47}{3}$     b.  $x = \frac{47}{4}$     c.  $x = \frac{95}{8}$   
 d. none of these    e.  $x = \frac{47}{8}$
16. Solve the logarithmic equation for  $x$ .  
 $\log_2 2 + \log_2 x = \log_2 3 + \log_2 (x-5)$   
 a.  $x = 15$     b.  $x = 3.9$     c.  $x = 17$   
 d.  $x = 30$     e.  $x = 12$
- Short Answer**
17. Solve the equation.  $x^2 2^x - 2^x = 0$   
 18. Solve the equation.  $x^2 7^x - x 7^x = 6(7^x)$   
 19. State the range of the function.  $h(x) = 2 + \left(\frac{1}{7}\right)^x$   
 20. State the range of the function  $y = 8 - e^x$   
 21. Determine the domain and range of the function  
 $h(x) = 5 - 2^x$   
 22. Graph  $f(x) = \log_2(x-2) - 2$ .  
 23. Graph the function  $y = 11^{x+3}$ . State the domain, range, and asymptote.  
 24. Graph  $y = 4^{x+2}$ .  
 25. Use the Laws of Logarithms to combine the expression.  $5 \log x - \frac{1}{3} \log(x^2 + 1) + 4 \log(x-1)$
26. Find the domain of the function.  $f(x) = \log_8(x+3)$   
 27. Use the Laws of Logarithms to expand the expression.  $\log_3(AB^5)$   
 28. Use the Laws of Logarithms to expand the expression.  $\ln \frac{3x^5}{(x+1)^9}$   
 29. Use the definition of the logarithmic function to find  $x$ .  
 (a)  $\log_3 x = 4$   
 (b)  $\log_{10} 0.000001 = x$   
 30. Use the Laws of Logarithms to combine the expression.  $2(\log_3 x + 2 \log_3 y - 4 \log_3 z)$   
 31. Given that  $\log_7 a = 4$  and  $\log_7 c = -5$ , find the following:  
 a.  $\log_7 ac$   
 b.  $\log_7 \frac{c}{a}$   
 c.  $\log_7 a^8$   
 d.  $\log_7 \sqrt[4]{c}$   
 32. Graph  $y = \frac{34}{1+16e^{-x}}$  and state the domain and range.  
 33. Graph  $y = \frac{45}{3+6e^{-x}}$ .

**Answer Section**

1. A    4. B    7. D    10. B    13. E    16. A    19.  $(2, \infty)$     21. D:  $(-\infty, \infty)$ ;  
 2. D    5. B    8. B    11. C    14. E    17. 1, -1    20.  $(-\infty, 8)$     R:  $(-\infty, 5)$   
 3. B    6. C    9. C    12. A    15. B    18. 3, -2  
 22.    24.    32. D:  $(-\infty, \infty)$   
 R:  $(0, 34)$



23. D:  $(-\infty, \infty)$ . R:  $(0, \infty)$ .  
 Asymptote:  $y = 0$ .



25.  $\log \left( \frac{x^5(x-1)^4}{\sqrt[3]{x^2+1}} \right)$   
 26.  $(-3, \infty)$   
 27.  $\log_3 A + 5 \log_3 B$   
 28.  $\ln 3 + 5 \ln x - 9 \ln(x+1)$   
 29. (a) 81; (b) -6  
 30.  $\log_3 \left( \frac{x^2 y^4}{z^8} \right)$   
 31. a. -1    b. -9    c. 32    d.  $-\frac{5}{4}$

