

State whether the function is an exponential growth function or exponential decay function, and describe its end behavior using limits.

1) $f(x) = 0.1^x$

1) decay

$\lim_{x \rightarrow \infty} f(x) = 0$
 $\lim_{x \rightarrow -\infty} f(x) = \infty$

Find the exponential function that satisfies the given conditions.

2) Initial value = 68, decreasing at a rate of 0.48% per week

2) $y = 68(.9952)^x$

Evaluate the logarithm.

3) $\log_8 \sqrt[3]{\frac{1}{64}}$

3) $x = -2/3$

Simplify the expression.

4) $e \ln 20$

4) $x = 20$

5) $10 \log 17$

5) $x = 17$

Rewrite the expression as a sum or difference or multiple of logarithms.

6) $\log_3 \left(\frac{x^9 y^3}{6} \right)$

6) $9 \log_3 x + 3 \log_3 y - \log_3 6$

Use the product, quotient, and power rules of logarithms to rewrite the expression as a single logarithm. Assume that all variables represent positive real numbers.

7) $4 \log x + 2 \log y$

7) $\log x^4 y^2$

Find the solution to the equation.

8) $9 - \log_3(x + 4) = 8$

8) $x = -1$

9) $4(7 - 3x) = \frac{1}{16}$

9) $x = 3$

Use a calculator to find an approximate solution to the equation.

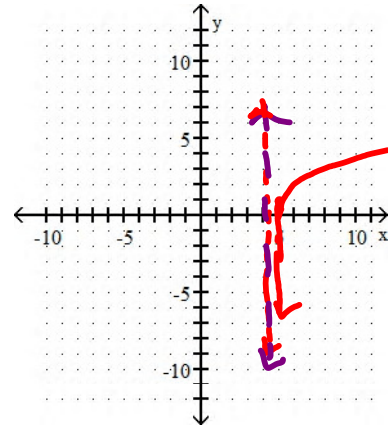
10) $\left(\frac{1}{5}\right)^x = 18$

10) -1.7959

Graph the function, then fill in the blanks.

11) $f(x) = \ln(x - 4) + 1$

11)



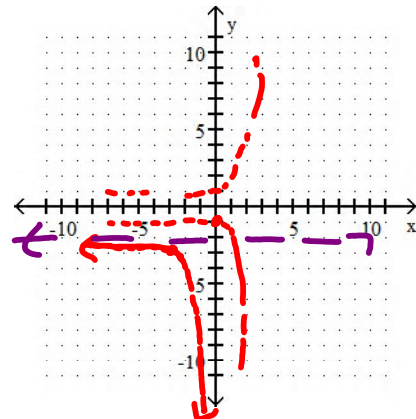
| | |
|---|---|
| x | 4 |
| 5 | 1 |
| 6 | 2 |

$e+1 = 6.7$

Domain: $(4, \infty)$
 Range: $(-\infty, \infty)$
 Asymptote: $x = 4$

12) $f(x) = -3x + 3 - 2$

12)



| | |
|----|--------|
| x | y |
| -3 | -3 |
| -2 | -5 |
| -4 | -2 1/3 |

Domain: $(-\infty, \infty)$
 Range: $(-\infty, -2)$
 Asymptote: $y = -2$

Use a calculator to find an approximate solution to the equation.

13) $e^{-0.13t} = 0.1$

13) $t = 17.7122$

14) $4\ln(x + 2.8) = 6.4$

14) $x = 2.1530$

Find the domain of the function.

15) $f(x) = \ln(9 - x)$

15) $(-\infty, 9)$

Solve the equation.

16) $\log 5x = \log 2 + \log(x + 3)$

16) $x = 2$

17) $\log(2 + x) - \log(x - 5) = \log 4$

17) $x = \frac{22}{3}$

18) $\log_6 x + \log_6(x - 3) = 2$

18) $x = 7.6847$

Solve the problem.

19) A cake is removed from an oven at 325 °F and cools to 150 °F after 25 minutes in a room 68 °F. How long will it take the cake to cool to 120 °F?

19) 35 min

Find the amount accumulated after investing a principal P for t years at an interest rate r.

20) $P = \$1,000$, $t = 4$, $r = 4\%$, compounded semiannually ($k = 2$)

20) $\$1,171.66$

Solve the problem.

21) Find the future value accumulated in an annuity after investing periodic payments of \$450 for 9 years at an annual interest rate of 5%, with payments made and credited 4 times per year.

21) $\$20,301.98$

22) Find the present value of a loan with an annual interest rate of 5.8% and periodic payments of \$707.43 for a term of 7 years, with payments made and interest charged 12 times per year.

22) $\$48,745.03$

23) At what interest rate must \$5700 be compounded annually to equal \$8842.57 after 9 yr? (Round to the nearest percent.)

23) 5%

Determine the doubling time of the investment.

24) \$19,500 at 5% compounded monthly

24) 13.89 yrs

Write the equation of the function reflected over the x-axis, left 5 units and up 3 units.

25) $f(x) = 4^x$

25) $y = -4^{(x+5)} + 3$