

Solve for x . Give exact answers. NO CALCULATORS, NO DECIMALS.

1. $\log_x \frac{1}{25} = \frac{-2}{3}$ 2. $\log_{\frac{1}{16}} x = \frac{5}{4}$ 3. $\ln(2x+5) + \ln(x+2) = \ln(4x+13)$
4. $2\log x - \log 4 = 2$ 5. $\left(\frac{1}{4}\right)^{1-4x} = 32^{x-1}$

Solve for x . Round answers to the nearest hundredth.

6. $50^{2x-1} + 7 = 407$ 7. $2e^{3x+5} = 14$ 8. $5^{2x+1} = 2^{4x-3}$

9. Solve for x . Leave your answer in terms of "e". $\ln(x+2) = 5$

10. Find the inverse of $y = \ln 9x^2$. Express your answer in terms of "e".

Evaluate. Give exact answers. NO CALCULATORS, NO DECIMALS.

11. $4\log_4 2 - \log_{27} 3$ 12. $\log_{\sqrt{6}} 4 + 2\log_{\sqrt{6}} 3$ 13. $3^{\log_3 6x}$

Evaluate. Round answers to the nearest hundredth.

14. $\log_3 8$ 15. $\ln 18 - \frac{1}{2}\ln 36$

Condense to a single simplified logarithm.

16. $3[\log(x-2) + 2\log(x+1) - \log(x+2) - 5\log(x-1)]$ 17. $3\ln 4 + 6$

18. Expand completely and simplify. $\log_3 \left(\frac{9A^2}{\sqrt[5]{B^2}} \right)$

19. If $\log_a 2 = x$ and $\log_a 3 = y$, find $\log_a \sqrt[3]{\frac{2}{9}}$.

Simplify to a single power of e .

20. $\frac{(e^{-3} \cdot e^{4x})^2}{e^5}$ 21. $\sqrt[4]{625e^{12}}$

22. Write an exponential function $y = ab^x$ (with $b > 0$) that contains $(1, 16)$ and $(3, 36)$.

23. Write a power function $y = ax^b$ that contains the points (2, 28) and (8, 192). Round decimals to thousandths.
24. The epidemic began with 30 persons infected. The number of infected persons increased by 47% each day after the epidemic began.
- (a) Write an exponential growth model for the number of infected persons (I), t days after the epidemic began.
- (b) How many persons were infected 1 week after the epidemic began?
- (c) To the nearest day, about how many days did it take for 6,600 persons to become infected?
25. The output power P (in watts) of a satellite is given by $P = 50e^{\frac{-t}{250}}$, where t is the number of days that the satellite has been in operation.
- (a) To the nearest watt, compute the power output of the satellite on the 45th day.
- (b) If the equipment aboard this satellite requires 15 watts of power, about how long, to the nearest day, will the satellite continue to operate ?
26. If you invest \$10,000 with an annual interest rate of 3.5% compounded semiannually, how much will your investment be worth at the end of 2 years? Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and round the answer to the nearest cent.

27-30: Graph each. Show asymptotes and give domain and range. List and plot at least 3 points, including the x - or y -intercept.

27. $y = \left(\frac{1}{4}\right)^{x-1} + 2$ 28. $y = 3e^x - 1$ 29. $y = \log_3 x - 4$

30. $y = \ln(x+3)$

Answers: 1. 125 2. $\frac{1}{32}$ 3. $\frac{1}{2}$ 4. 20 5. $-\frac{1}{2}$ 6. 1.27 7. -1.02

8. -8.27 9. $e^5 - 2$ 10. $\frac{e^{x/2}}{3}$ 11. $1\frac{2}{3}$ 12. 4 13. $6x$ 14. 1.89

15. 1.10 16. $\log \frac{(x-2)^3(x+1)^6}{(x+2)^3(x-1)^{15}}$ 17. $\ln 64e^6$ 18. $2 + 2\log_3 A - \frac{2}{5}\log_3 B$

19. $\frac{1}{3}x - \frac{2}{3}y$ 20. e^{8x-11} 21. $5e^3$ 22. $y = \frac{32}{3}\left(\frac{3}{2}\right)^x$

23. $y = 10.691x^{1.389}$ 24. (a) $I = 30(1.47)^t$ (b) 445 persons (c) 14 days

25. (a) 42 watts (b) 301 days 26. \$10718.59