

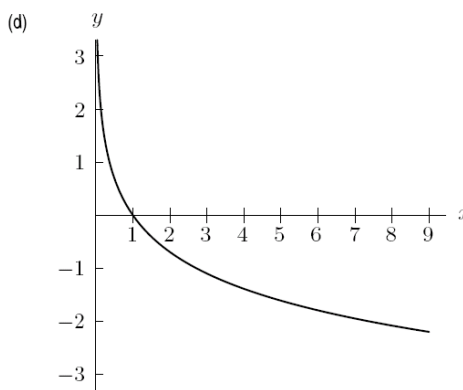
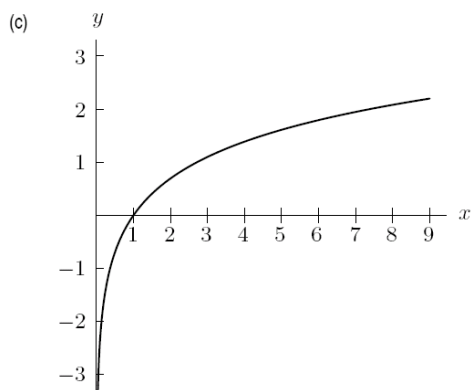
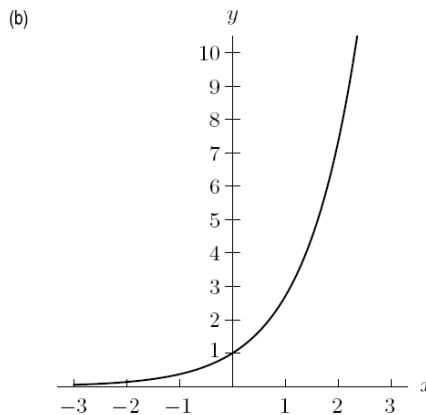
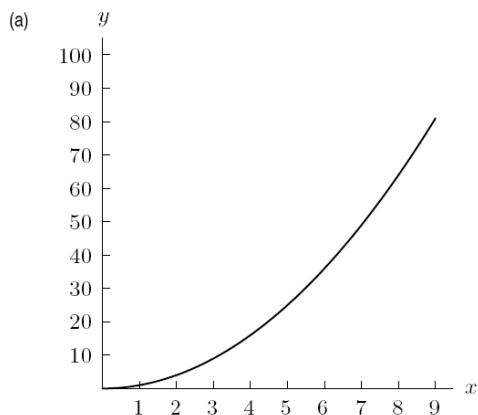
Classroom Voting Questions: Precalculus

Logarithmic Functions

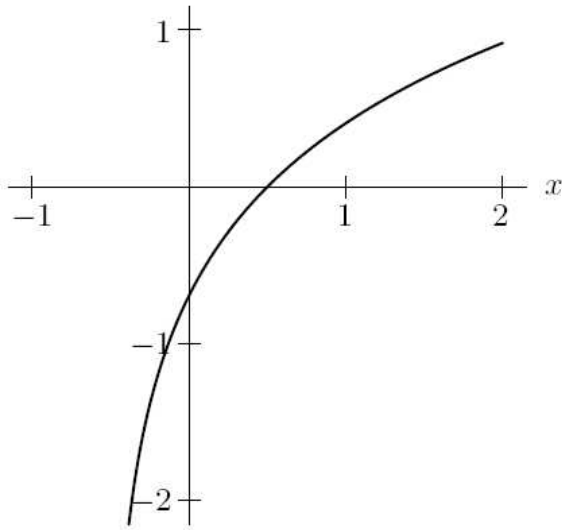
1. A logarithmic function of the form $f(x) = \log_a x$ will always pass through the point $(1, 0)$.

- (a) True, and I am very confident.
- (b) True, but I am not very confident.
- (c) False, but I am not very confident.
- (d) False, and I am very confident.

2. Which is a graph of $y = \ln x$?

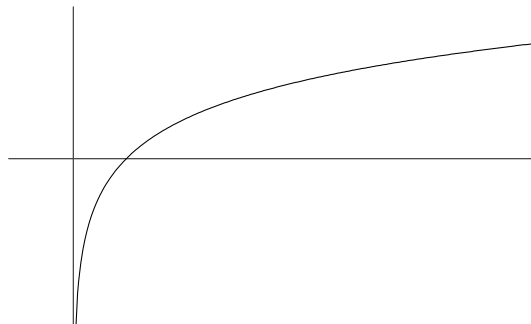


3. The graph below could be that of



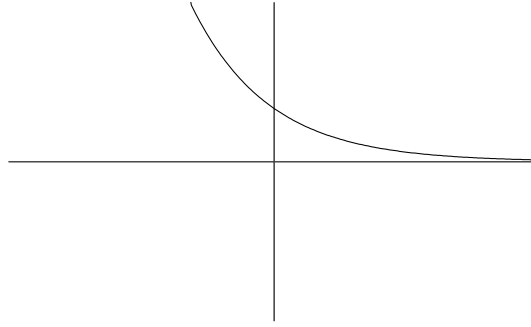
- (a) $y = \ln x + \frac{1}{2}$
- (b) $y = \ln x - \frac{1}{2}$
- (c) $y = \ln \left(x + \frac{1}{2}\right)$
- (d) $y = \ln \left(x - \frac{1}{2}\right)$

4. Which equation matches this graph?



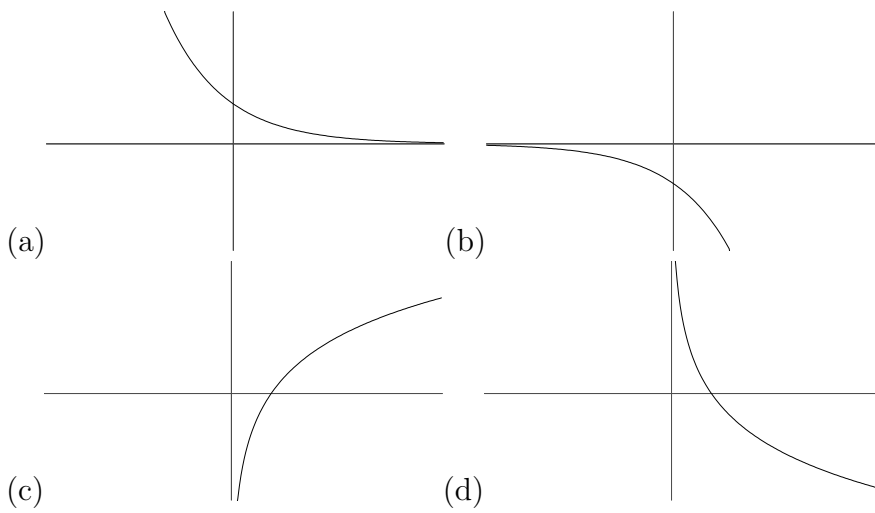
- (a) $y = b^x$ with $b > 1$
- (b) $y = b^x$ with $0 < b < 1$
- (c) $y = \log_b x$ with $b > 1$
- (d) $y = \log_b x$ with $0 < b < 1$

5. Which equation matches this graph?

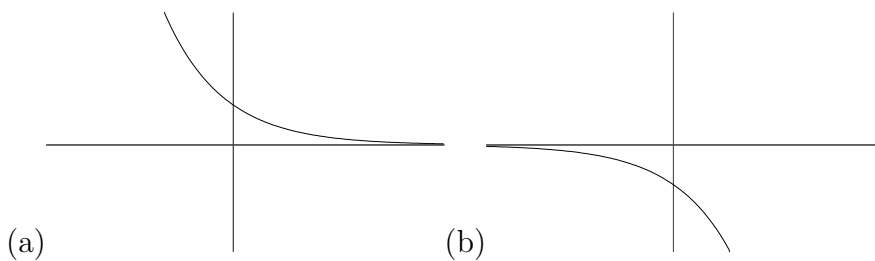


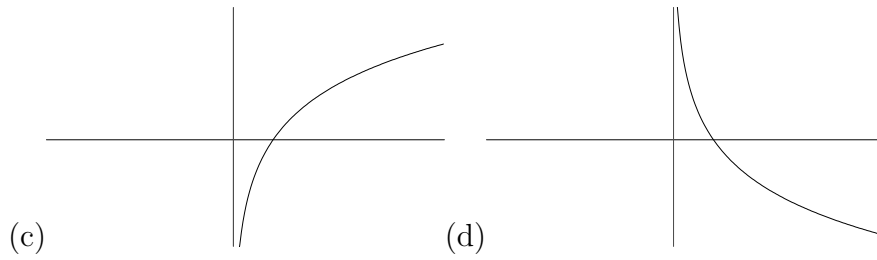
- (a) $y = b^x$ with $b > 1$
- (b) $y = b^x$ with $0 < b < 1$
- (c) $y = \log_b x$ with $b > 1$
- (d) $y = \log_b x$ with $0 < b < 1$

6. Which of the following is a graph of $y = \log_2 x$?



7. Which of the following is a graph of $y = \log_{\frac{1}{2}} x$?





8. Which of the following functions have vertical asymptotes of $x = 3$?

- (a) $y = \ln(x/3)$
- (b) $y = \ln(x - 3)$
- (c) $y = \ln(x + 3)$
- (d) $y = 3 \ln x$

9. $\log\left(\frac{M-N}{M+N}\right) =$

- (a) $2 \log M$
- (b) $2 \log N$
- (c) $-2 \log N$
- (d) $\log(M - N) - \log(M + N)$

10. If $\log_{10}(x - a) = n$, then $x =$

- (a) 10^{a+n}
- (b) $a + 10^n$
- (c) $n + 10^a$
- (d) $n + a^{10}$

11. What is the exponential form of $\log_r m = j$?

- (a) $r^j = m$
- (b) $j^r = m$
- (c) $m^j = r$
- (d) $r^m = j$

12. What is the logarithmic form of $k^p = d$?

- (a) $\log_d k = p$
- (b) $\log_k d = p$
- (c) $\log_p d = p$
- (d) $\log_k p = d$

13. What is the value of $\log_{11} 86$? (Calculators are allowed.)

- (a) .4049
- (b) .5383
- (c) 1.8576
- (d) -2.0564

14. What is $3 = \log_2 8$ in exponential form?

- (a) $2^8 = 3$
- (b) $3^2 = 8$
- (c) $8^3 = 2$
- (d) $2^3 = 8$

15. What is $k = \log_m q$ in exponential form?

- (a) $m^k = q$
- (b) $k^q = m$
- (c) $m^q = k$
- (d) $q^m = k$

16. What is $4^2 = 16$ in logarithmic form?

- (a) $\log_2 4 = 16$
- (b) $\log_4 16 = 2$
- (c) $\log_4 2 = 16$
- (d) $\log_{16} 4 = 2$

17. What is $3^{-1} = \frac{1}{3}$ in logarithmic form?

(a) $\log_3(-1) = \frac{1}{3}$

(b) $\log_{-1} \frac{1}{3} = 3$

(c) $\log_{\frac{1}{3}} 3 = -1$

(d) $\log_3 \frac{1}{3} = -1$

18. What is the inverse of the following function:

$$P = f(t) = 16 \ln(14t)$$

(a) $f^{-1}(P) = \frac{1}{14}e^{16P}$

(b) $f^{-1}(P) = \frac{1}{14}e^{P/16}$

(c) $f^{-1}(P) = \frac{1}{14} \ln(P/16)$

(d) $f^{-1}(P) = \frac{\ln 16}{14}P$

19. Solve for x if $8y = 3e^x$.

(a) $x = \ln 8 + \ln 3 + \ln y$

(b) $x = \ln 3 - \ln 8 + \ln y$

(c) $x = \ln 8 + \ln y - \ln 3$

(d) $x = \ln 3 - \ln 8 - \ln y$

20. Solve for x if $y = e + 2^x$

(a) $x = \frac{\ln y - 1}{\ln 2}$

(b) $x = \frac{\ln(y-1)}{\ln 2}$

(c) $x = \frac{\ln y}{\ln 2} - 1$

(d) $x = \frac{\ln(y-e)}{\ln 2}$

21. Write the following expression using a single logarithmic function:

$$\ln(2x^3 + 1) + 5 \ln(3 - x) - \ln(6x^5 + 2x + 1).$$

(a) $\ln(-6x^5 + 2x^3 - 7x + 15)$

(b) $\ln[(2x^3 + 1)(15 - 5x)(-6x^5 - 2x - 1)]$

- (c) $\ln \left(\frac{(2x^3 + 1)(3 - x)^5}{6x^5 + 2x + 1} \right)$
 (d) $\ln \left(\frac{(2x^3 + 1)(15 - 5x)}{6x^5 + 2x + 1} \right)$

22. $\log \left(\frac{a^4 b^7}{c^5} \right) =$

- (a) $\log(a^4) + \log(b^7) + \log(c^5)$
 (b) $4 \log a + 7 \log b - 5 \log c$
 (c) $28 \log ab - 5 \log c$
 (d) $\frac{28}{5} (\log a + \log b - \log c)$
 (e) None of the above

23. Simplify the following expression: $\ln \left(\frac{\sqrt{x^2 + 1}(x^3 - 4)}{(3x - 7)^2} \right)$.

- (a) $\frac{1}{2} \ln(x^2 + 1) + \ln(x^3 + 4) - 2 \ln(3x - 7)$
 (b) $\ln \left(\frac{1}{2}(x^2 + 1) \right) + \ln(x^3 + 4) - 2 \ln(3x - 7)$
 (c) $\ln(x^2 + 1) \ln(x^3 + 4) \ln(3x - 7)$
 (d) $\ln[(x^2 + 1)(x^3 + 4)(3x - 7)]$

24. 25 rabbits are introduced to an island, where they quickly reproduce and the rabbit population grows according to an exponential model $P(t) = P_0 e^{kt}$ so that the population doubles every four months. If t is in months, what is the value of the continuous growth rate k ?

- (a) $k = \frac{1}{2} \ln 4$
 (b) $k = \frac{1}{4} \ln 2$
 (c) $k = \frac{1}{50} \ln \frac{4}{25}$
 (d) $k = \frac{4}{25} \ln \frac{1}{50}$
 (e) None of the above

25. Simplify $(\log_{16} 4) \left(\log_3 \frac{1}{9} \right)$.

(a) $\frac{16}{3}$

(b) $\frac{4}{9}$

(c) 1

(d) -1