Classroom Voting Questions: Precalculus

Logarithmic Functions

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

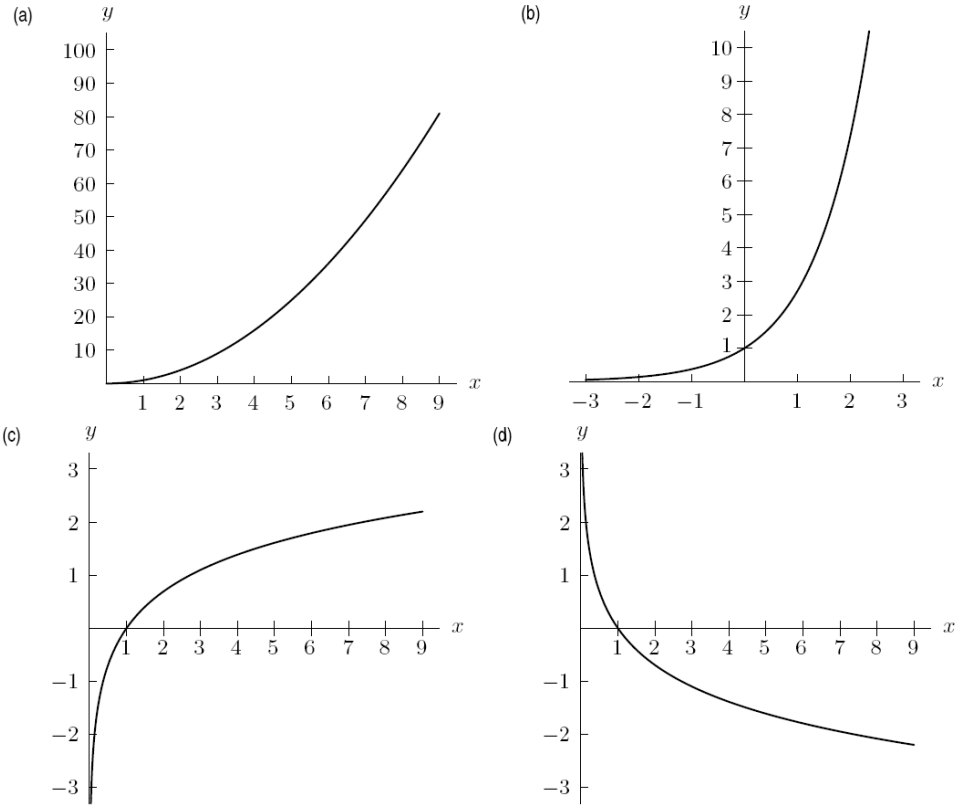
   (a) True, and I am very confident.

   (b) True, but I am not very confident.

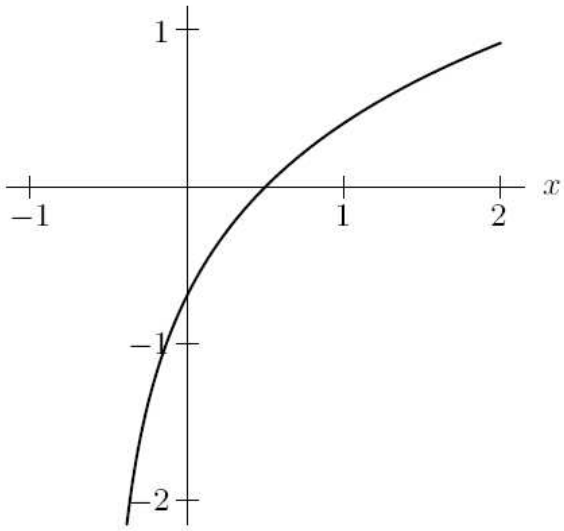
   (c) False, but I am not very confident.

   (d) False, and I am very confident.

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

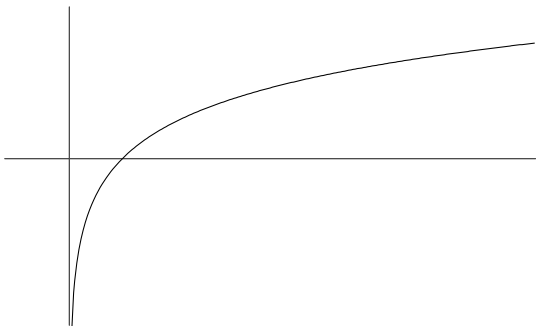


3. The graph below could be that of



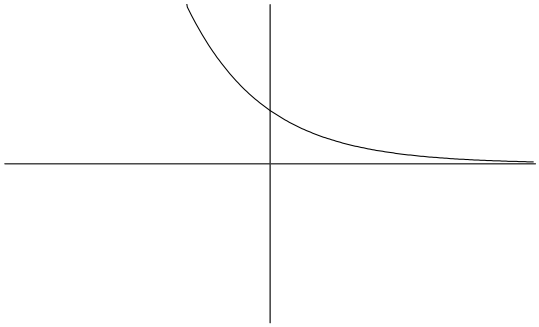
(a) $y = \ln x + \frac{1}{2}$
(b) $y = \ln x - \frac{1}{2}$
(c) $y = \ln\left(x + \frac{1}{2}\right)$
(d) $y = \ln\left(x - \frac{1}{2}\right)$

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?



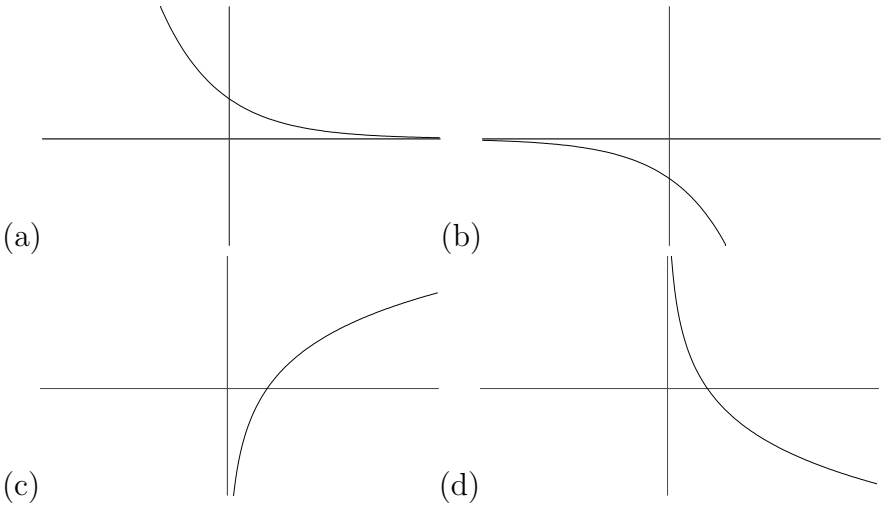
(a) $y = b^x$ with $b > 1$

(b) $y = b^x$ with $0 < b < 1$

(c) $y = \log_b x$ with $b > 1$

(d) $y = \log_b x$ with $0 < b < 1$

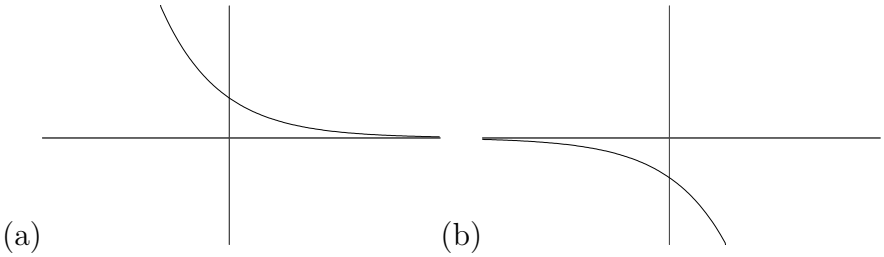
6. Which of the following is a graph of $y = \log_2 x$?



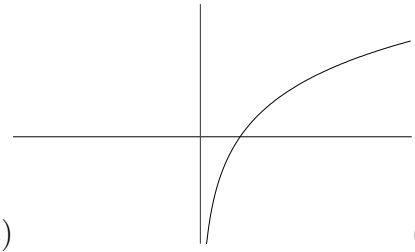
(a) (b)

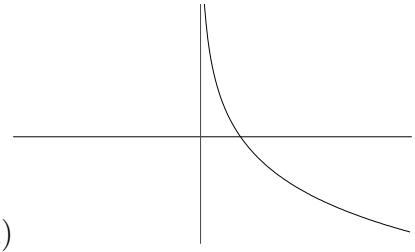
(c) (d)

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



(a) (b)

(c) 

(d) 

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 $3^{-1} = \dfrac{1}{3}$ in logarithmic form?

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

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

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

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

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) $\ln\left(\dfrac{(2x^3+1)(3-x)^5}{6x^5+2x+1}\right)$

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

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

(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: $\ln\left(\dfrac{\sqrt{x^2+1}(x^3-4)}{(3x-7)^2}\right)$.

(a) $\dfrac{1}{2}\ln(x^2+1)+\ln(x^3+4)-2\ln(3x-7)$

(b) $\ln\left(\dfrac{1}{2}(x^2+1)\right)+\ln(x^3+4)-2\ln(3x-7)$

(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 $P(t)=P_0e^{kt}$ 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 $(\log_{16}4)\left(\log_3\dfrac{1}{9}\right)$.

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

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

(c) 1

(d) -1