

For all questions, answer E. "NOTA" means none of the above answer is correct.

1. Write an equivalent exponential equation $-\log_b v = w$

- A) $b^w = -v$ B) $-b^w = v$ C) $b^{-w} = \frac{1}{v}$ D) $b^w = \frac{1}{v}$ E) NOTA

2. Given $\ln 4 = a$ and $\ln 5 = b$, find $\ln 40$.

- A) $3a + b$ B) $\frac{2}{3}a + b$ C) $a^{3/2} + b$ D) $\frac{3}{2}a + b$ E) NOTA

3. Solve for t if $P = P_0 e^{-kt}$.

- A) $\frac{1}{k}(\ln P_0 - \ln P)$ B) $-\frac{\ln P}{k \ln P_0}$ C) $\frac{1}{k}(\ln P - \ln P_0)$ D) $k(\ln P - \ln P_0)$
E) NOTA

4. If $f(x) = 2^x \cdot x^2$, find $f^{-1}(2)$

- A) 1 B) 2 C) 8 D) 16 E) NOTA

5. Solve for x if $\log_5(\log_3 x) = 0$.

- A) {0} B) {1} C) {4} D) {5} E) NOTA

6. If x, y, a, b, P and Q are positive, which of the following statements are true?

$$I. \log\left(\frac{x}{y}\right) = \frac{\log x}{\log y}$$

$$II. \log_5\left(\frac{a}{b^2}\right) = \log_5 a - 2\log_5 b$$

$$III. (\log P)(\log Q) = \log P + \log Q$$

$$IV. (\log_2 7)^x = x \log_2 7$$

- A) I and II B) II and III C) II only D) II and IV E) NOTA

7. Evaluate the equation for u . $\log_u 8 + \log_{\frac{1}{3}} 27 - \log_{\frac{1}{3}} 81 = -2$

- A) $\frac{1}{2}$ B) 2 C) $\frac{1}{3}$ D) 3 E) NOTA

8. Solve for x . $\log_2 x + \log_4 x + \log_8 x = 11$

- A) 0 B) 2 C) 64 D) 1 E) NOTA

9. Which of the following is equal to a positive number?

- A) $\log_{0.2} 0.2$ B) $\log_2 0.2$ C) $\log_{0.2} 2$ D) $\log_{0.2} 1$ E) NOTA

10. Express $1 - 3\log_5 x$ as a logarithm of a single expression

- A) $\log_5 \frac{1}{x^2}$ B) $\log_5 \frac{5}{3x}$ C) $\log_5 \frac{5}{x^3}$ D) $\frac{1}{\log_5 x^3}$ E) NOTA

11. Solve for x : $3^x - 7 = -12(3^{-x})$

- A) 1 B) $\log_3 4$ and 1 C) $\log_3 4$ D) 3 and 4 E) NOTA

12. If $\log_8 M + \log_8 \frac{1}{6} = \frac{2}{3}$, find M .

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) 24 D) 2 E) NOTA

13. Find the value of $\log_2 3 \cdot \log_3 4 \cdot \log_4 5 \cdot \log_5 6 \cdot \log_6 7 \cdot \log_7 8$

- A) $\log 4$ B) $\log 3$ C) $\log_{4.5} 33$ D) 4 E) NOTA

14. Solve for x , if $c \neq 1$: $e^{ax} = ce^{bx}$

- A) 0 B) $\frac{\ln c}{a-b}$ C) $\frac{\ln c}{b-a}$ D) $\frac{b \ln c}{a}$ E) NOTA

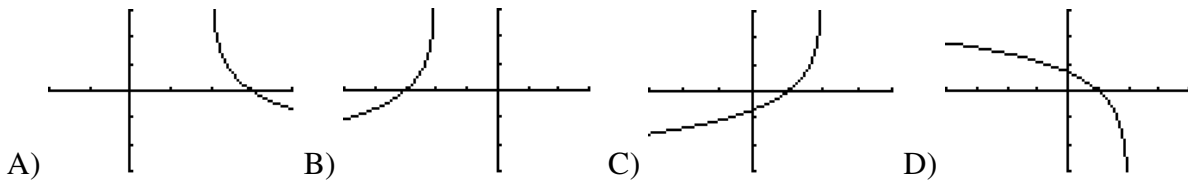
15. Solve for x in the real number system. $4^x - 2^{x+1} = 3$

- A) $\log_2 3$ B) $\log_2(-1)$ C) 0 D) 3, -1 E) NOTA

16. An isotope of sodium has a half-life of 15 hours. A sample of this isotope has a mass of 2 grams. Find the amount in grams remaining immediately after 60 hours have passed.

- A) 4 B) 8 C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) NOTA

17. Graph the following function. $f(x) = -\ln(2-x)$. The units shown on all graphs are 1.



E) NOTA

18. A sum of D dollars is placed in an account at $R\%$ per annum, compounded continuously. When (in years) will the balance reach E dollars?

A) $\frac{\ln E - \ln D}{R}$ B) $\frac{100(\ln E - \ln D)}{R}$ C) $\frac{\ln E - \ln D}{100R}$ D) $\frac{\ln D - \ln E}{R}$

E) NOTA

19. Solve the inequality: $\log_{1/2} x < -1$

A) $x > 1/2$ B) $x < 1/2$ C) $x > 2$ D) $x < 2$ E) NOTA

20. Find the domain of $f(x) = \log\left(\frac{x+1}{x-5}\right)$.

A) $(-\infty, -1) \cup (5, \infty)$ B) $(-1, 5)$ C) $(-\infty, -1] \cup (5, \infty)$ D) $[-1, 5)$ E) NOTA

21. Find the value of $\log_2 2 \cdot \log_2 4 \cdot \dots \cdot \log_2 2^n$

A) $\log 2^n$ B) $n! \log 2$ C) n D) $n!$ E) NOTA

22. Solve for x : $3(\ln x)^2 - \ln(x^2) - 8 = 0$

A) $\{-4/3, 2\}$ B) $\{e^{-4/3}, e^2\}$ C) $\{e^2\}$ D) $\{e^{-4/3}\}$ E) NOTA

23. Solve the inequality: $e^{(1/x)-1} > 1$

A) $(-\infty, 1)$ B) $(1, \infty)$ C) $(0, 1)$ D) $(-\infty, 0) \cup (1, \infty)$ E) NOTA

24. Solve for x : $\log_6 x = \frac{1}{\frac{1}{\log_2 x} + \frac{1}{\log_3 x}}$

- A) 0 B) $(0, \infty)$ C) $(-\infty, 0) \cup (0, \infty)$ D) $(-\infty, \infty)$ E) NOTA

25. Solve the system of equations. $(\log_3 x)^2 = \log_3 x^2$
 $\log_3(x + y) = \log_3 x + \log_3 y$

- A) all points $(1, y)$ for $y > 0$ B) $\left(9, \frac{9}{8}\right)$ C) $(9, 9)$ D) $\left(1, \frac{1}{8}\right)$
 E) NOTA

26. Find the inverse. $f(x) = e^{e^x}$

- A) $f^{-1}(x) = e^{e^y}$ B) $f^{-1}(x) = e^{e^x}$ C) $f^{-1}(x) = \ln(\ln(\ln x))$
 D) $f^{-1}(x) = \ln(\ln(\ln e))$ E) NOTA

27. Solve the inequality: $5(4 - 0.3^x) > 10$

- A) $x > \log_{0.3} 2$ B) $x < \log_{0.3} 2$ C) $x > \log_2 0.3$ D) $x < \log_2 0.3$
 E) NOTA

28. Solve the inequality: $\ln x + \ln(x - 3) \leq \ln 4$

- A) $(-\infty, -1] \cup [4, \infty)$ B) $[-1, 4]$ C) $(3, 4]$ D) $[4, \infty)$ E) NOTA

29. Find the inverse of $f(x) = 2e^{-x}$

- A) $y = \ln(2/x)$ B) $y = \ln(x/2)$ C) $y = \ln(2 - x)$ D) $y = \frac{1}{2} \ln x$
 E) NOTA

30. Solve for x if $3x(10^x) + 10^x = 0$

- A) $\{0, -\frac{1}{3}\}$ B) $\{0\}$ C) $\{-\frac{1}{3}\}$ D) $\{\}$ E) NOTA