MATHS

BOOKS - DHANPAT RAI & CO MATHS (HINGLISH)

LOGARITHMS

Illustration

1. If $(\log)_3 y = x$ and $(\log)_2 z = x,$ find 72^x in terms of y and z

A. yz^3

B. y^2z^3

C. y^3z^2

D. y^3z^3

Answer: B

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2. If $\frac{\log_{10} a}{2} = \frac{\log_{10} b}{3} = \frac{\log_{10} c}{5}$, then bc =

A. a

B. a^2

C. a^3

D. a^4

Answer: D

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3. If $\log_4 5 = x$ and $\log_5 6 = y$, then $\log_2 3$ is equal to

A. 2xy + 1

B. 2xy-1

C. 2x+1

D. 2y + 1

Answer: B

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4. If $x = \log_{0.1} 0.001$, $y = \log_9 81$, then $\sqrt{x - 2\sqrt{y}}$ is equal to

A. $3 - 2\sqrt{2}$

B. $\sqrt{3} - 2$

C. $\sqrt{2} - 1$

D. $\sqrt{2} - 2$

Answer: C

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5. If $\log_3 a \times \log_a x = 4$, then x is equal to

A. 64

B. 81

C. a^2

D. 12

Answer: B

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6. If a and b are positive real numbers other than unity, then the least value of $|\log_b a + \log_a b|$, is

A. 0

B. 1

C. 2

D. none of these

Answer: C

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7. If a, b, c are positive real numbers, then

$$\frac{1}{\log_{ab} abc} + \frac{1}{\log_{bc} abc} + \frac{1}{\log_{ca} abc} =$$

A. 0

B. 1

C. 2

D. none of these

Answer: C

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8. If $x = 27$ and $y = \log_3 4,$ then x^y equals

A. 64

B. 16

C. $\frac{3}{7}$

D. $\frac{1}{16}$

Answer: A

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9. The value of $16^{\log_4 3}$, is

A. 8

B. 3

C. 4

D. 9

Answer: D

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10. If $\log_3 x + \log_9 x^2 + \log_{27} x^3 = 9$, then x =

A. 3

B. 9

C. 27

D. none of these

Answer: C

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11. The value of $\log_8 128$, is

A. $\frac{7}{3}$

B. 16

C. $\frac{3}{7}$

D. $\frac{1}{16}$

Answer: A

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12. The value of $2^{\log 3^5} - 5^{\log 3^2}$ is

A. 2

B. -1

C. 1

D. 0

Answer: D

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13. If $\log_{10} 7 = 0.8451$, find the position of the first significant figure in 7^{-20}.

A. 15

B. 20

C. 17

D. 18

Answer: C

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Section I Solved Mcqs

1. If $0 \leq a \leq x$, then the minimum value of

$\log_a x + \log_x$ is

A. 1

B. 2

C. 0

D. none of these

Answer: B

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2. If a, b, c are positive real numbers, then

$a^{\log b - \log c} \times b^{\log c - \log a} \times c^{\log a - \log b}$

A. 0

B. 1

C. -1

D. none of these

Answer: B

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3. The value of $(bc)^{\log\left(\frac{b}{c}\right)} \cdot (ca)^{\log\left(\frac{c}{a}\right)} \cdot (ab)^{\log\left(\frac{a}{b}\right)}$ is

A. 0

B. -1

C. 1

D. none of these

Answer: C

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4. If

$x = (\log)_{2a}a, y = (\log)_{3a}2a, z = (\log)_{4a}3a, provethat 1 + xyz = 2yz.$

A. 2yz

B. 2xy

C. 2zx

D. none of these

Answer: A

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5. If a, b, c are positive real numbers then

$$\frac{1}{1+\log_a bc}+\frac{1}{1+\log_b ca}+\frac{1}{1+\log_c ab}=$$

A. 0

B. 1

C. 2

D. -1

Answer: B

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6. If $y = a^{\frac{1}{1-(\log)_{a^x}}} and z = a^{\frac{1}{1-(\log)_{a^y}}}, then prove that x = a^{\frac{1}{1-(\log)_{a^z}}}$

A. $\frac{1}{a^{1-\log az}}$

B. $\frac{1}{1-\log_a z}$

C. $\frac{1}{1+\log_z a}$

D. $\frac{1}{1-\log_z a}$

Answer: B

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7. If $a = \log 2, b = \log 3, c = \log 7$ and $6^x = 7^{x+4}$ then $x =$

A. $\frac{4b}{c+a-b}$

B. $\frac{4c}{a+b-c}$

C. $\frac{4b}{c-a-b}$

D. $\frac{4a}{a+b-c}$

Answer: B

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8. Given $a^2 + b^2 = c^2 \& a.0; b > 0; c > 0,\ c - b \neq 1,\ c + b \neq 1,$ prove that : $(\log)_{c+b} a + (\log)_{c-b} a = 2(\log)_{c+b} a \log_{c-b} a$

A. 1

B. 2

C. -1

D. -2

Answer: B

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9. If $5^x = (0.5)^y = 1000,$ then $\frac{1}{x} - \frac{1}{y} =$

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. $\frac{1}{4}$

Answer: C

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10. If $4^x + 2^{2x-1} = 3^{x+\frac{1}{2}} + 3^{x-\frac{1}{2}}$, then x =..

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $\frac{5}{2}$

D. 1

Answer: B

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11. If $\frac{\log x}{2a+3b-5c} = \frac{\log y}{2b+3c-5a} = \frac{\log z}{2c=3a-5b'}$ then xyz=

A. 2

B. 1

C. 0

D. -1

Answer: B

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12. $If \log x = \frac{\log y}{2} = \frac{\log z}{5}, thtenx^4y^3z^{-2} =$

A. 2

B. 10

C. 1

D. 0

Answer: C

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13. If $\log a = \frac{1}{2}\log b = \frac{1}{5}\log c$ then $a^4 b^3 c^{-2} =$

A. a = 24

B. b = 81

C. c= 64

D. c = 256

Answer: D

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14. If $a = \log_{24} 12, b = \log_{36} 24, c = \log_{48} 36,$ then show that $1 + abc = 2bc$

A. 2bc-1

B. 2bc+1

C. bc-1

D. bc+1

Answer: A

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15. If a,b,c are any three consecutive integers , prove that $\log(1 + ac) = 2\log b$

A. $\log b$

B. $\log\left(\frac{b}{2}\right)$

C. $\log(2b)$

D. $2\log b$

Answer: D

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16. If $\frac{\log_a x}{\log_{ab} x} = 4 + k + \log_a b$, then $k =$

A. 0

B. 1

C. -2

D. -3

Answer: D

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17. If $x = \log_a(bc), y = \log_b(ca)$ and $z = \log_c(ab)$, then which of the following is correct?

A. $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$

B. $\frac{1}{x-1} + \frac{1}{y-1} + \frac{1}{z-1} = 1$

C. xyz =x + y + z + 1

D. xyz = 1

Answer: A

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18. $\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} + \ldots + \frac{1}{\log_{43} n} =$

A. 1

B. $\log_{43!} n$

C. $\log_n 43!$

D. none of these

Answer: C

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19. If n is a natural number such that $n = P_1^{a_1} P_2^{a_2} P_3^{a_3} \ldots P_k^{a_k}$ where $p_1, p_2, \ldots p_k$ are distinct primes then minimum value of $\ln n$ is:

A. $k\log 2$

B. $k\log 3$

C. $k\log 4$

D. none of these

Answer: A

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20. The number $\log_2(7)$ is

A. an integer

B. a rational number

C. an irrational number

D. a prime number

Answer: C

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21. If in a right angled triangle, $a \; and \; b$ are the lengths of sides and c is the length of hypotenuse and $c - b \neq 1, \; c + b \neq 1$, then show that $(\log)_{c+b} a + (\log)_{c-b} = 2(\log)_{c+b} a \log_{c-b} a.$

A. 1

B. 2

C. $\frac{1}{2}$

D. none of these

Answer: B

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22. If

$$\frac{1}{\log_2 a}+\frac{1}{\log_4 a}+\frac{1}{\log_8 a}+\frac{1}{\log_{16} a}+\ldots.+\frac{1}{\log_{2^n} a}=\left(n\frac{n+1}{\lambda}\right)$$

then λ equals

A. $\log_2 a$

B. $\log_a 4$

C. $\log_2 a^2$

D. none of these

Answer: C

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23. If $\log_4 5 = x$ and $\log_5 6 = y$, then $\log_2 3$ is equal to

A. $\frac{1}{2x+1}$

B. $\frac{1}{2y+1}$

C. 2xy +1

D. $\frac{1}{2xy-1}$

Answer: D

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24. The value of $x^{\log_x a \times \log_a y \times \log_y z}$ is

A. x

B. y

C. z

D. a prime number

Answer: C

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25. If $\log_{ax} x, \log_{bx} x, \log_{cx} x$ are in H.P., where a, b, c, x belong to $(1, \infty)$, then a, b, c are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: B

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26. If $a(b-c)x^2+b(c-a)xy+c(a-b)y^2=0$ is a perfect square, then $\frac{\log(a+c)+\log(a-2b+c)}{\log(a-c)}$ is equal to

A. 3

B. 4

C. 2

D. 1

Answer: C

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27. If $\frac{\log a}{b-c}=\frac{\log b}{c-a}=\frac{\log c}{a-b}$, then $a^{b+c}.\ b^{c+a}.\ c^{a+b}$=

A. $a^b b^c c^a=1$

B. $a^a b^b c^c=1$

C. $\sqrt[a]{a}\sqrt[b]{b}\sqrt[c]{c}=1$

D. none of these

Answer: B

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28. The solution set of $\log_2|4-5x|>2$, is

A. $(8/5, \infty)$

B. $(4/5, 8/5)$

C. $(-\infty, 0) \cup (8/5, \infty)$

D. none of these

Answer: C

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29. The sum of the series

$\log_4 2 - \log_8 2 + \log_{16} 2 - \log_{32} 2 + \ldots,$ is

A. e^2

B. $\log_e 2 + 1$

C. $\log_e 3 - 2$

D. $1 - \log_e 2$

Answer: D

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30. $(\log)_{0.3}(x-1) < (\log)_{0.09}(x-1) then x$ in the lies in the interval- $(2, \infty)$ b. $(1, 2)$ c.$(-2, -1)$ d. $(-\infty, 2)$

A. $(2, \infty)$

B. $-2, -1$

C. $(1, 2)$

D. none of these

Answer: A

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31. The values of x satisfying $x^{\log_5} > 5$ lie in the interval

A. $(0, \infty)$

B. $(0, 1/5) \cup (5, \infty)$

C. $(1, \infty)$

D. (1, 2)

Answer: B

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32. The solution set of the equation

$\log_x 2 \times \log_{2x} 2 = \log_{4x} 2,$ is

A. $\left\{2^{-\sqrt{2}}, 2^{\sqrt{2}}\right\}$

B. $\left\{\frac{1}{2}, 2\right\}$

C. $\left\{\frac{1}{4}, 4\right\}$

D. none of these

Answer: A

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33. The set of real values of x satisfying

$\log_{0.2}\left(\frac{x+2}{x}\right) \leq 1,$ is

A. $(-\infty, -5/2] \cup (0, \infty)$

B. $[5/2, \infty)$

C. $(-\infty, -2) \cup (0, \infty)$

D. none of these

Answer: A

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34. Solve for x :

$5^{\log x} + 5x^{\log 5} = 3 \ (a > 0)$

A. $2^{\log_a 5}$

B. $2^{-\log_a 5}$

C. $2^{-\log_5 a}$

D. $2^{\log_5 a}$

Answer: C

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35. The number of solutions of $\log_{\sin x}\left(2^{\tan x}\right) > 0$ in the interval $(0, \pi/2)$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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36. The set of real values of x for which

$2^{\log_{\sqrt{2}}(x-1)} > x + 5,$ is

A. $(-\infty, -1) \cup (4, \infty)$

B. $(4, \infty)$

C. $(-1, 4)$

D. none of these

Answer: B

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37. The number of solutions of $\log_2(x+5) = 6 - x,$ is

A. 2

B. 0

C. 3

D. none of these

Answer: D

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38. The set of values of x for which $\log_e x > \frac{x-2}{x}$, is

A. $(1, \infty)$

B. $(1, 2)$

C. R

D. $(2, \infty)$

Answer: D

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39. The number of solutions of the equation

$3\log_3|-x| = \log_3 x^2,$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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40. The number of values of x satisfying

$1 + \log_5\left(x^2 + 1\right) \geq \log_5\left(x^2 + 4x + 1\right)$, is

A. 1

B. 2

C. 3

D. infinitely many

Answer: D

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41. The number of ordered pairs (x, y) satisfying $4\left(\log_2 x^2\right)^2 + 1 = 2\log_2 y$ and $\log_2 x^2 \geq \log_2 y$, is

A. 1

B. 2

C. more than 2 but finite

D. infinite

Answer: D

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42. $\frac{1}{\log_{\sqrt{bc}} abc} + \frac{1}{\log_{\sqrt{ca}} abc} + \frac{1}{\log_{\sqrt{ab}} abc}$ has the value equal to

A. 0

B. $1/2$

C. 1

D. 2

Answer: C

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43. The solution set of the equation

$\log_{1/3}\left(2^{x+2}-4^{x}\right) \geq -2$, is

A. $\left(-\infty, 2-\sqrt{13}\right)$

B. $\left(-\infty, 2+\sqrt{13}\right)$

C. $\left(-\infty, 2\right)$

D. none of these

Answer: C

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44. The value of

$e^{\log_e x+\log_{\sqrt{e}} x+\log_{\sqrt[3]{e}} x+\ldots .+\log_{\sqrt[10]{e}} x}$, is

A. x^{10}

B. e

C. x^{55}

D. none of these

Answer: C

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45. IF $x = 198!$ then value of the expression $\frac{1}{\log_2 x} + \frac{1}{\log_3 x} + \ldots + \frac{1}{\log_{198} x}$ equals

A. -1

B. 0

C. 1

D. 198

Answer: C

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46. If $[.]$ denotes the greatest integer function, then thevalue of natural number n satisfying the equation $[\log_2 1] + [\log_2 2] + [\log_2 3] + \ldots . + [\log_2 n] = 1538$, is

A. 255

B. 256

C. 254

D. 313

Answer: A

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47. The set of real values of x satisfying $\log_{\frac{1}{2}}\left(x^2 - 6x + 12\right) \geq -2$

A. $(-\infty, 2]$

B. $[2, 4]$

C. $[4, \infty)$

D. none of these

Answer: B

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48. If $\log_{0.04}(x-1) \geq \log_{0.2}(x-1)$ then x belongs to the interval

A. $(1, 2]$

B. $(-\infty, 2]$

C. $[2, \infty)$

D. none of these

Answer: C

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49. If $\log_a x \times \log_5 a = \log_x 5, a \neq 1, a > 0, \quad \text{then} \quad x =$

A. a

B. $5, \frac{1}{5}$

C. 1

D. none of these

Answer: B

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50. If $\log_{0.5} \sin x = 1 - \log_{0.5} \cos x,$ then the number of solutions of $x \in [-2\pi, 2\pi]$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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51. If $x_1, x_2, x_3, \ldots$ are positive numbers in G.P then $\log x_n, \log x_{n+1}, \log x_{n+2}$ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: A

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52. If $\log_{\cos x} \sin x \geq 2$ and $x \in [0, 3\pi]$ then $\sin x$ lies in the interval

A. $\left[\frac{\sqrt{5}-1}{2}, 1\right]$

B. $\left(0, \frac{\sqrt{5}-1}{2}\right]$

C. $[0, 1/2]$

D. none of these

Answer: B

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53. The number of values of x $\in [0, n\pi], n \in Z$ that satisfy the equation $\log_{|\sin x|}(1 + \cos x) = 2$ is

A. 0

B. n

C. 2n

D. none of these

Answer: A

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54. If $9^{\log_3(\log_2 x)} = \log_2 x - (\log_2 x)^2 + 1$, then x =

A. 1

B. $1/2$

C. 3

D. none of these

Answer: D

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55. If $x^{\left\{\frac{3}{4}(\log_3 x)^2 + (\log_3 x) - \frac{5}{4}\right\}} = \sqrt{3}$, then x has

A. all integral values

B. two integral values and one irrational values

C. all irrational values

D. two rational values and an irrational value

Answer: D

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56. If $\log_{\cos x}\tan x + \log_{\sin x}\cot x = 0,$ then x =

A. $n\pi + \frac{\pi}{4}, n \in Z$

B. $2n\pi + \frac{\pi}{4}, n \in Z$

C. $2n\pi - \frac{3\pi}{4}, n \in Z$

D. none of these

Answer: B

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57. The number of solutions of the equation

$x^{\log\sqrt{x}^{2x}} = 4$ is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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58. If $\log_{\sqrt{3}}\left(\sin x + 2\sqrt{2}\cos x\right) \geq 2, \ -2\pi \leq x \leq 2\pi,$ then the number of values of x, is

A. 0

B. 3

C. infinite

D. none of these

Answer: D

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59. The least value of the expression $2(\log)_{10}x-(\log)_x(0,01)\cdot$ for $x>1,$ is 10 (b) 2 (c) -0.01 (d) 4

A. 1

B. 2

C. 4

D. none of these

Answer: C

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60. The number of zeroes coming immediately after the decimal point in the value of $(0.2)^{25}$ is : Given $\log_{10} 2 = 0.30103)$

A. 16

B. 17

C. 18

D. none of these

Answer: B

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61. If $\log_{\frac{1}{\sqrt{2}}} \sin x > 0, x \in [0, 4\pi]$, then the number values of x which are integral multiples of $\frac{\pi}{4}$,is

A. 6

B. 12

C. 3

D. none of these

Answer: A

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62. The value of $\sum_{r=1}^{89} \log_{10}\left(\tan\left(\frac{\pi r}{180}\right)\right)$ is equal to

A. 10

B. 1

C. 0

D. none of these

Answer: C

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63. If [x] denotes the greatest integer less than or equal to x, then $[\log_{10} 6730.4] =$

A. 6

B. 4

C. 5

D. none of these

Answer: D

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64. If $a_n > a_{n-1} > \ldots. > a_2 > a_1 > 1$, then the value of $\log_{a_1} \log_{a_2} \log_{a_3} \ldots. \log_{a_n}$ is equal to

A. 0

B. 1

C. 2

D. none of these

Answer: B

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65. If $n = 1999!$ then $\sum_{x=1}^{1999} \log_n x =$

A. 1

B. 0

C. $\sqrt[1999]{1999}$

D. -1

Answer: A

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66. Let $a = (\log)_3(\log)_3 2$. An integer k satisfying $1 < 2^{-k+3^{(-a)}} < 2$, must be less than .....

A. 1

B. 2

C. 0

D. -1

Answer: A

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67. If $\log_{10}(x^3 + y^3) - \log_{10}(x^2 + y^2 - xy) \leq 2$ then the minimum value of xy for all $x \geq 0, y \geq 0$ is

A. 2500

B. 3000

C. 1200

D. 3500

Answer: A

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68. The value of $6+\log_{\frac{3}{2}}\left(\frac{1}{3\sqrt{2}}\sqrt{4-\frac{1}{3\sqrt{2}}\sqrt{4-\frac{1}{3\sqrt{2}}\sqrt{4-\frac{1}{3\sqrt{2}}\ldots..}}}\right)$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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69. If $3^x = 4^{x-1}$ then x can not be equal to

A. $\frac{2\log_3 2}{2\log_3 2 - 1}$

B. $\frac{2}{2 - \log_2 3}$

C. $\frac{1}{1 - \log_4 3}$

D. $\frac{2\log_2 3}{2\log_2 3 - 1}$

Answer: D

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70. For the system of equation

$\log_{10}(x^3 - x^2) = \log_5 y^2$

$\log_{10}(y^3 - y^2) = \log_5 z^2$

$\log_{10}(z^3 - z^2) = \log_5 x^2$

Which of the following is/are true?

A. there are infinite number of solutions

B. there is unique solution with x,y, z $\in$ Q

C. there are exactly two solutions with x, y, z $\in$ Q

D. there is no solution

Answer: B

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Section Ii Assertion Reason Type

1. Statement -1: $0 < x < y \Rightarrow \log_a x > \log_a y, \text{where} 0 < a < 1$

Statement-2: $\log_a x$ is a decreasing function when $0 < a < 1$.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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2. Statement-1: $0 < x < y \Rightarrow \log_a x > \log_a y,$ where $a > 1$

Statement-2: $\text{When} a > 1, \log_a x$ is an increasing function.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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3. Statement-1: $\log_{10}x < \log_{\pi}x < \log_{e}x < \log_{2}x$

Statement-2: $x < y \Rightarrow \log_{a}x > \log_{a}y \quad \text{when} \quad 0 < a < 1$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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4. Statement-1: $3^{\log_2 7} - 7^{\log_2 3} = 0$

Statement-2: $x^{\log_a y} = y^{\log_a x}, \quad \text{where} \quad x > 0, y > 0 \quad \text{and} \quad a > 0, a \neq 1$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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5. Statement-1: If $a = y^2, b = z^2 \quad \text{and} \quad c = x^2, \quad \text{then} \log_a x^3 \times \log_b y^3 \times \log_c z^3 = \frac{27}{8}$

Statement-2: $\log_b a = \dfrac{1}{\log_a b}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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6. Statement-1: The solution set of the equation $\log_x 2 \times \log_{2x} 2 = \log_{4x} 2 \text{is} \left\{2^{-\sqrt{2}}, 2^{\sqrt{2}}\right\}$. Statement-2 : $\log_b a = \dfrac{1}{\log_a b}$ and $\log_a xy = \log_a x + \log_a y$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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7. Statemen-1: If $x < 1$, then the least value of $\log_2 x^3 - \log_x(0.125)$ is 6.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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8. Statement-1 : If $x^{\log_x(3-x)^2} = 25$, then x =-2

Statement-2: $a^{\log_a x} = x$, if $a > 0, x > 0$ and $a \neq 1$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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Exercise

1. Find the value of $7\log\left(\frac{16}{15}\right)+5\log\left(\frac{25}{24}\right)+3\log\left(\frac{81}{80}\right)$.

A. $\log 2$

B. $\log 3$

C. $\log 5$

D. none of these

Answer: A

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2. The value of $\frac{\log 49\sqrt{7}+\log 25\sqrt{5}-\log 4\sqrt{2}}{\log 17.5}$, is

A. 5

B. 2

C. $\frac{5}{2}$

D. $\frac{3}{2}$

Answer: C

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3. The value of $5^{\sqrt{\log_5 7}}-7^{\sqrt{\log_7 5}}$ is

A. $\log 2$

B. 1

C. 0

D. none of these

Answer: C

Watch Video Solution

4. The value of $2^{\log_3 7} - 7^{\log_3 2}$ is

A. $\log 2$

B. 1

C. 0

D. none of these

Answer: C

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5. The value of $\frac{3 + \log 343}{2 + \frac{1}{2}\log\left(\frac{49}{4}\right) + \frac{1}{3}\log\left(\frac{1}{125}\right)}$, is

A. 3

B. 2

C. 1

D. $\frac{3}{2}$

Answer: A

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6. If $\log_{30} 3 = x, \log_{30} 5 = y$, then $\log_{30} 8 =$

A. $3(1 - x - y)$

B. $x - y + 1$

C. $1 - x - y$

D. $2(x - y + 1)$

Answer: A

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7. If $\log_a x, \log_b x, \log_c x$ are in A.P., where $x \neq 1$, then $c^2 =$

A. $(ab)^{\log_a b}$

B. $(ac)^{\log_a b}$

C. $(ab)^{\log_b a}$

D. $(ac)^{\log_b a}$

Answer: B

Watch Video Solution

8. if $a^2 + 4b^2 = 12ab$, then $\log(a + 2b)$

A. $\frac{1}{2}(\log a + \log b - \log 2)$

B. $\log\frac{a}{2} + \log\frac{b}{2} + \log 2$

C. $\frac{1}{2}(\log a + \log b + 4\log 2)$

D. $\frac{1}{2}(\log a - \log b + 4\log 2)$

Answer: C

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9. If $9a^2 + 4b^2 = 18ab$, then $\log(3a + 2b) =$

A. $\log 5 + \log 3 + \log a + \log 5b$

B. $\log 5 + \log 3 + \log 3a + \log b$

C. $\log 5 + \log a + \log b$

D. none of these

Answer: D

Watch Video Solution

10. The value of

$$\log_5\left(1+\frac{1}{5}\right)+\log_5\left(1+\frac{1}{6}\right)+\log_5\left(1+\frac{1}{7}\right)+\ldots.+\log_5\left(1+\frac{1}{624}\right)$$

is

A. 5

B. 4

C. 3

D. 2

Answer: C

Watch Video Solution

11. If $\log(x-y)-\log 5-\frac{1}{2}\log x-\frac{1}{2}\log y=0$ then $\frac{x}{y}+\frac{y}{x}$ is equal to

A. 25

B. 26

C. 27

D. 28

Answer: C

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12. If $2^{\log_{10} 3\sqrt{3}} = 3^{k\log_{10} 2}$, then k =

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. 3

D. 2

Answer: B

Watch Video Solution

13. If $\log_{10} 343 = 2.5353$ then the least positive integer 'n' such that $7^n > 10^5$ is

A. 1

B. 6

C. 5

D. 4

Answer: B

Watch Video Solution

14. If $\log_{10} 2 = 0.3010$, then $\log_5 64 =$

A. $\frac{602}{233}$

B. $\frac{233}{602}$

C. $\frac{202}{633}$

D. $\frac{633}{202}$

Answer: A

Watch Video Solution

15. If $4^{\log_9 3} + 9^{\log_2 4} = 10^{\log_x 83}$, then $x =$

A. 4

B. 9

C. 83

D. 10

Answer: D

Watch Video Solution

16. Find the value of $3^{\frac{4}{\log_2 9}} + 27^{\frac{1}{\log_{49} 9}} + 81^{\frac{1}{\log_4 3}}$

A. 890

B. 860

C. 857

D. none of these

Answer: C

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17. The value of $\log_{\sqrt{2}}\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}$, is

A. $\frac{15}{16}$

B. $\frac{7}{16}$

C. $\frac{15}{8}$

D. $\frac{31}{32}$

Answer: C

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18. The value of $a^{\frac{\log_b(\log_b x)}{\log_b a}}$, is

A. $\log_a x$

B. $\log_b x$

C. $\log_x a$

D. $\log_x b$

Answer: B

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19. The value of $\frac{\log_a(\log_b a)}{\log_b(\log_a b)}$, is

A. $\log_b a$

B. $\log_a b$

C. $-\log_a b$

D. $-\log_b a$

Answer: C

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20. If $\log_2 x + \log_4 x + \log_{16} x = \frac{21}{4}$, then x equals to

A. 8

B. 4

C. 2

D. 16

Answer: A

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21. If $\log_{10}\left\{98 + \sqrt{x^2 - 12x + 36}\right\} = 2$, then x =

A. 4

B. 8

C. 12

D. 4, 8

Answer: D

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22. If $a^x = b^y = c^z = d^w$ then $\log_a(bcd) =$

A. $\frac{1}{x}\left(\frac{1}{y}+\frac{1}{z}+\frac{1}{w}\right)$

B. $x\left(\frac{1}{y}+\frac{1}{z}+\frac{1}{w}\right)$

C. $\frac{y+z+w}{x}$

D. none of these

Answer: B

Watch Video Solution

23. If $\log_5(\log_5(\log_2 x)) = 0$ then the value of x, is

A. 32

B. 125

C. 625

D. 125

Answer: A

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24. The number of solutions of the equation $\log_4(x-1) = \log_2(x-3)$, is

A. 3

B. 1

C. 2

D. 0

Answer: B

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25. If $\log_2 a + \log_4 b + \log_4 c = 2$

$\log_9 a + \log_3 b + \log_9 c = 2$

$\log_{16} a + \log_{16} b + \log_4 c = 2$, then

A. $a = \frac{2}{3}, b = \frac{27}{8}, c = \frac{32}{3}$

B. $a = \frac{27}{8}, b = \frac{2}{3}, c = \frac{32}{3}$

C. $a = \frac{32}{3}, b = \frac{27}{8}, c = \frac{2}{3}$

D. $a = \frac{2}{3}, b = \frac{32}{3}, c = \frac{27}{8}$

Answer: A

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26. If $y = 2^{1/\log_x 8}$, then x equal to

A. y

B. y^2

C. y^3

D. none of these

Answer: C

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27. If $\log_y x = \log_z y = \log_x z$, then

A. $x < y < z$

B. $x > y \geq z$

C. $x < y \leq z$

D. $x = y = z$

Answer: D

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28. If $3^{2x+1} \cdot 4^{x-1} = 36$ then find the value of x

A. $\log_{36} 48$

B. $\log_{48} 36$

C. $\log_{24} 12$

D. $\log_{12} 24$

Answer: A

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29. If $\log_x \left\{ \log_4 \left(\log_x \left(5x^2 + 4x^3 \right) \right) \right\} = 0$, then

A. 2

B. 3

C. 4

D. 5

Answer: D

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30. If $\frac{1}{\log_x 10} = \frac{2}{\log_a 10} - 2$, then x =

A. $\frac{a}{2}$

B. $\frac{a}{100}$

C. $\frac{a^2}{10}$

D. $\frac{a^2}{100}$

Answer: D

Watch Video Solution

31. If $\log_{12} 27 = a$, then $\log_6 16 =$

A. $\frac{3-a}{3+a}$

B. $4\left(\frac{3-a}{3+a}\right)$

C. $3\left(\frac{4-a}{4+a}\right)$

D. $3\left(\frac{4+a}{4-a}\right)$

Answer: B

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32. If $(4.2)^x = (0.42)^y = 100, \quad \text{then} \quad \frac{1}{x} - \frac{1}{y} =$

A. 1

B. 2

C. $\frac{1}{2}$

D. -1

Answer: C

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33. If $\log_8 x = 25$ and $\log_2 y = 50$, then x =

A. $y^{3/2}$

B. 2y

C. y

D. $\frac{y}{2}$

Answer: A

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34. If $\log_e 2.\ \log_x 27 = \log_{10} 8.\ \log_e 10$, then x =

A. 1

B. 3

C. 2

D. 4

Answer: B

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35. If $3 + \log_5 x = 2\log_{25} y$, then x equals to

A. $\frac{y}{125}$

B. $\frac{y}{25}$

C. $\frac{y^2}{25}$

D. $3 - \frac{y^2}{25}$

Answer: A

Watch Video Solution

36. If $\frac{\log a}{3} = \frac{\log b}{4} = \frac{\log c}{5}$, then ca equals

A. 2b

B. b^2

C. 8b

D. 4b

Answer: B

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37. $2^x \times 3^{2x} = 100$ then x belongs to

A. (0, 3)

B. (1, 3)

C. (1, 2)

D. (0, 2)

Answer: C

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38. If $x^{2\log_{10}x} = 1000x$, then x equals to

A. $10, \sqrt{10}$

B. $10^{-1}, 10\sqrt{10}$

C. $10\sqrt{10}$

D. $\sqrt{10}$

Answer: B

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39. If $\log_{10}5 = x, \quad \text{then } \log_5 1250$ equals to

A. $3 - \frac{1}{x}$

B. $2 + \frac{1}{x}$

C. $3 + \frac{1}{x}$

D. $2 - \frac{1}{x}$

Answer: C

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40. If $5^{3x^2\log_{10}2} = 2^{\left(x+\frac{1}{2}\right)\log_{10}25}$, then x equals to

A. $1, -\frac{1}{3}$

B. 1

C. $1, -\frac{1}{2}$

D. $-\frac{1}{3}, 1$

Answer: A

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41. If $\log_x\left(4x^{\log_5 x} + 5\right) = 2\log_5 x$, then x equals to

A. $4, 5$

B. $-1, 5$

C. $4, \ -1$

D. $5, \ \frac{1}{3}$

Answer: D

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42. The equation $\log_e x + \log_e(1 + x) = 0$ can be written as

A. $x^2 + x - 1 = 0$

B. $x^2 + x + 1 = 0$

C. $x^2 + x - e = 0$

D. $x^2 + x + e = 0$

Answer: A

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43. If x $=\log_3(5)$ and y $=\log_{17}(25)$, which one of the following is correct?

A. $x < y$

B. $x = y$

C. $x > y$

D. none of these

Answer: C

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44. If $x = \log_a(bc), y = \log_b(ca)$ and $z = \log_c(ab)$, then which of the following is correct?

A. $x + y + z = 1$

B. $\frac{1}{1+x} + \frac{1}{1+y} + \frac{1}{1+z} = 1$

C. xyz =1

D. none of these

Answer: B

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45. The value of $\log_2\log_2\log_4 256 + 2\log_{\sqrt{2}}2$, is

A. 2

B. 3

C. 5

D. 7

Answer: C

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46. $\frac{\log a}{y-z} = \frac{\log b}{z-x} = \frac{\log c}{x-y}$ then value of $abc =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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47. If $\log_2 7 = x$, then x is:

A. a rational number such that $0 < x < 2$

B. an irrational number such that $2 < x < 3$

C. a rational number such that $2 < x < 3$

D. a prime number of the form $7x + 2$

Answer: B

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48. If $2^{\frac{3}{\log_3 x}} = \frac{1}{64}$, then x =

A. 3

B. $\frac{1}{3}$

C. $\frac{1}{\sqrt{3}}$

D. $-\frac{1}{\sqrt{3}}$

Answer: C

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49. If $a = 1 + \log_x yz, b = 1 + \log_y zx, c = 1 + \log_z xy,$ then ab+bc+ca =

A. 0

B. 2abc

C. abc

D. $a^2 + b^2 + c^2$

Answer: C

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50. If $\frac{\log x}{a^2 + ab + b^2} = \frac{\log y}{b^2 + bc + c^2} = \frac{\log z}{c^2 + ca + a^2}$, then $x^{a-b} \cdot y^{b-c} \cdot z^{c-a} =$

A. 0

B. -1

C. 1

D. 2

Answer: C

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51. If $\log(2a-3b)=\log a-\log b,$ then $a=$

A. $\frac{3b^2}{2b-1}$

B. $\frac{3b}{2b-1}$

C. $\frac{b^2}{2b+1}$

D. $\frac{3b^2}{2b+1}$

Answer: A

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52. If $\frac{\log 3}{x-y}=\frac{\log 5}{y-z}=\frac{\log 7}{z-x},$ then $3^{x+y}5^{y+z}7^{z+x}=$

A. 0

B. 2

C. 1

D. none of these

Answer: C

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53. $\frac{\log_2 a}{3} = \frac{\log_2 b}{4} = \frac{\log_2 c}{5\lambda}$ and $a^{-3}b^{-4}c = 1$ then $\lambda =$

A. 3

B. 4

C. 5

D. -5

Answer: C

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54. if $\frac{\log a}{b-c} = \frac{\log b}{c-a} = \frac{\log c}{a-b}$ then find the value of $a^a b^b c^c$

A. 0

B. 1

C. abc

D. none of these

Answer: B

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55. The value of $(0.16)^{\log_{0.25}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots . \text{to}\,\infty\right)}$, is

A. 0.16

B. 1

C. 0.4

D. 4

Answer: D

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56. if $a^2 + 4b^2 = 12ab$, then $\log(a + 2b)$

A. $\frac{1}{2}(\log a + \log b - \log 2)$

B. $\log\frac{a}{2} + \log\frac{b}{2} + \log 2$

C. $\frac{1}{2}(\log a + \log b + 4\log 2)$

D. $\frac{1}{2}(\log a - \log b + 4\log 2)$

Answer: C

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57. Find the value of $7\log\left(\frac{16}{15}\right) + 5\log\left(\frac{25}{24}\right) + 3\log\left(\frac{81}{80}\right)$.

A. log2

B. log3

C. 1

D. 0

Answer: A

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58. If $\frac{1}{2}\log x + \frac{1}{2}\log y + \log 2 = \log(x+y)$ then :

A. x+y = 0

B. x-y =0

C. xy =1

D. $x^2 + xy + y^2 = 0$

Answer: B

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59. The number of real solutions of the equation $\log(-x) = 2\log(x+1)$, is

A. 0

B. 1

C. 2

D. 4

Answer: B

Watch Video Solution

60. The solution of the equation $\log_{\pi}(\log_{2}(\log_{7}x)) = 0$, is

A. 7^2

B. π^2

C. 2^2

D. none of these

Answer: A

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61. If $\log_4 2 + \log_4 4 + \log_4 16 + \log_4 x = 6$, then x =

A. 4

B. 64

C. 32

D. 8

Answer: C

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62. The number of real values of the parameter k for which the equation $(\log_{16} x)^2 - \log_{16} x + \log_{16} k = 0$ with real coefficients will have exactly one solution, is

A. 2

B. 1

C. 4

D. none of these

Answer: B

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63. If $a^x = b, b^y = c, c^z = a,$ then find the value of xyz.

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

64. The value of $\log_b a \times \log_c b \times \log_a c$, is

A. 0

B. 1

C. log abc

D. 10

Answer: B

Watch Video Solution

65. If $\log_a ab = x,$ then the value of $\log_b ab,$ is

A. $\frac{x-1}{x}$

B. $\frac{x}{x-1}$

C. $\frac{x}{x+1}$

D. $\frac{x+1}{x}$

Answer: B

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66. If $x = -2$, then the value of $\log_4\left(\frac{x^2}{4}\right) - 2\log_4\left(4x^4\right)$, is

A. 2

B. -4

C. -6

D. 0

Answer: C

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67. The value of $\sqrt{4 \times \log_{0.5} 2}$, is

A. -2

B. $\sqrt{-4}$

C. 2

D. none of these

Answer: B

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Chapter Test

1. If $x^{\frac{3}{2}(\log_2 x - 3)} = \frac{1}{8}$, then x equals to

A. 2

B. 3

C. 5

D. 6

Answer: A

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2. If $\log_4\left(3x^2+11x\right)>1$, then x lies in the interval

A. $(-4, 1/3)$

B. $(-4, 2)$

C. $[-4, 1/3]$

D. $(-\infty, -4)\cup(1/3, \infty)$

Answer: D

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3. If $\log_6(x+3)-\log_6 x=2$, then x =

A. $\frac{1}{35}$

B. $\frac{3}{35}$

C. $\frac{2}{35}$

D. $-\frac{3}{35}$

Answer: B

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4. If $2^x.9^{2x+3} = 7^{x+5}$, then x =

A. $\frac{5\log 7 + 6\log 3}{\log 162 - \log 7}$

B. $\frac{5\log 7 - 6\log 3}{\log 162 + \log 7}$

C. $\frac{5\log 7 - 6\log 3}{\log 162 - \log 7}$

D. none of these

Answer: C

Watch Video Solution

5. If $\log_7\left\{\log_5\left(\sqrt{x+5}+\sqrt{x}\right)\right\}=0$ then x =

A. 3

B. 4

C. 2

D. none of these

Answer: B

Watch Video Solution

6. If $\log_6\left\{\log_4\left(\sqrt{x+4}+\sqrt{x}\right)\right\}=0$, then x =

A. 1

B. $\frac{5}{4}$

C. $\frac{7}{4}$

D. $\frac{9}{4}$

Answer: D

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7. If $x^{\log_x(x^2-4x+5)} = (x-1)$, then x =

A. 1

B. 2

C. 4

D. 5

Answer: B

Watch Video Solution

8. If $\log_3\left\{\log_6\left(\frac{x^2+x}{x-1}\right)\right\} = 0$ then x =

A. -1

B. 1

C. 3

D. 4

Answer: C

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9. If $\log_8\left\{\log_2\log_3\left(x^2-4x+85\right)\right\}=\frac{1}{3}$, then x equals to

A. 5

B. 4

C. 3

D. 2

Answer: D

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10. If $x = \log_2 3$ and $y = \log_{1/2} 5$, then

A. $x > y$

B. $x < y$

C. $x = y$

D. none of these

Answer: A

Watch Video Solution

11. If $\log_{x+2}\left(x^3 - 3x^2 - 6x + 8\right) = 3$, then x equals to

A. 1

B. 2

C. 3

D. none of these

Answer: D

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12. If $(2.3)^x = (0.23)^y = 1000$, then find the value of $\frac{1}{x} - \frac{1}{y}$.

A. $\frac{1}{5}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

Answer: C

Watch Video Solution

13. If $10^{x-1} + 10^{-x-1} = \frac{1}{3}$, then x equals to

A. $\pm \log_{10} 3$

B. $2\log_3 10$

C. $\log_3 3$

D. $\log_2 10$

Answer: A

Watch Video Solution

14. $(\log)_2(\log)_2(\log)_3(\log)_3 27^3$ is 0 b. 1 c. 2 d. 3

A. 1

B. 0

C. 3

D. 2

Answer: B

Watch Video Solution

15. If $2\log_8 a = x, \log_2 2a = y$ and $y - x = 4,$ then x =

A. 10

B. 16

C. 4

D. 6

Answer: D

Watch Video Solution

16. If $\log_{10} x = y,$ then $\log_{10^3} x^2$ equals

A. $\frac{1}{3}y$

B. $\frac{2}{3}y$

C. $\frac{3}{2}y$

D. 3y

Answer: B

Watch Video Solution

17. If $\log_3 x \times \log_x 2x \times \log_{2x} y = \log_x x^2$, then y equals

A. 9

B. 18

C. 27

D. 81

Answer: A

Watch Video Solution

18. The number of solutions of $\log_2(x-1) = 2\log_2(x-3)$ is

A. 2

B. 1

C. 6

D. 7

Answer: B

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19. If $\frac{1}{\log_3 \pi} + \frac{1}{\log_4 \pi} > x$, then the greatest integral value of is

A. 2

B. 3

C. π

D. none of these

Answer: A

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20. Let $x \in (1, \infty)$ and n be a positive integer greater than 1. If $f_n(x) = \dfrac{n}{\frac{1}{\log_2 x} + \frac{1}{\log_3 x} + \ldots + \frac{1}{\log_n x}}$, then $(n!)^{f_n(x)}$ equals to

A. n^x

B. x^n

C. n^n

D. n^{nx}

Answer: B

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21. If $\log_2 \sin x - \log_2 \cos x - \log_2 (1 - \tan^2 x) = -1$, then x =

A. $\dfrac{n\pi}{2} + \dfrac{\pi}{8}, n \in Z$

B. $n\pi - \dfrac{\pi}{8}, n \in Z$

C. $\dfrac{n\pi}{4} + \dfrac{\pi}{2}, n \in Z$

D. none of these

Answer: A

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