

MU ALPHA THETA CONVENTION 1991

LOGS AND EXPONENTS TOPIC TEST

1. Solve for x : $x-1=\log_3 81$
 A. 1 B. 2 C. 3 D. 4 E. 5

2. If $\log_2(x+6) + \log_2(x-6) = 6$, then $x=$
 A. -10 B. 10 C. ± 10 D. 10; 100 E. no solution

3. Simplify: $\frac{2^{3x-2} \cdot 4^{x-2}}{32^{x-1}}$
 A. 2^{x-5} B. 2^3 C. $\frac{1}{2}$ D. 2^{1-2x} E. $\frac{x}{2}$

4. If $a=\log_4 7$ find 2^a .
 A. $\frac{1}{7}$ B. $\frac{\sqrt{7}}{7}$ C. $\sqrt{7}$ D. 7 E. 49

5. $(1+i)^{20} =$
 A. -1024 B. -512 C. 512i D. 1024i E. 2048

6. $3^{x+4y} = \left(\frac{1}{9}\right)^{y-2x}$. Find $\frac{x}{y}$.
 A. 1 B. $\frac{5}{4}$ C. $\frac{3}{2}$ D. $\frac{7}{4}$ E. 2

7. $(10)^a (20)^b = 4000$. If a and b are integers, find $a+b$.
 A. 2 B. 3 C. 4 D. 5 E. 7

8. If $b^a = a^b$, then what is $\log_b a$?
- A. $\frac{a}{b}$ B. $\frac{b}{a}$ C. 1 D. a E. b
9. How many values of r satisfy the equation $\log_r(7r+6) = 3$?
- A. 0 B. 1 C. 2 D. 3 E. 4
10. If $\log_b(a) = x$, then find $\frac{\log_a(b)}{\log_b(a)}$ in terms of x .
- A. $\frac{1}{x^2}$ B. $\frac{1}{x}$ C. 1 D. $\frac{1}{2x}$ E. $\frac{\sqrt{x}}{x}$
11. The sum of the x and y -intercepts of the graph of $y = 2^{(x-1)} - 2$ is
- A. $-\frac{1}{2}$ B. 0 C. $\frac{1}{2}$ D. 1 E. 2
12. For how many real values of x is $x^{2y} + x^{-2y} - 2 = 0$?
- A. 0 B. 1 C. 2 D. 3 E. can't be determined
13. $a = \log_5 2$, $b = \log_5 3$. Express $\log_{25} 96$ in terms of a and b .
- A. $(1.5)a + (.5)b$ B. $(2.5)a + b$ C. $(1.5)a + b$
 D. $2a + b$ E. $(2.5)a + (.5)b$
14. If $\left(\frac{1}{a}\right)^{\left(\frac{1}{b}\right)} = x$, find a^b in terms of x and b .
- A. $\left(\frac{1}{x^b}\right)$ B. $x^{\left(\frac{1}{b}\right)}$ C. $\left(\frac{1}{x}\right)^{\left(\frac{1}{b}\right)}$ D. $x^{\left(\frac{1}{b}\right)^2}$ E. $\left(\frac{1}{x}\right)^{b^2}$
15. Find the greatest integer x for which $3^{20} > (32)^x$.
- A. 5 B. 6 C. 7 D. 8 E. 9

16. Simplify: $\log_9 [27(243)^{\frac{1}{2}}]$
- A. $\frac{11}{4}$ B. $\frac{9}{2}$ C. $\frac{7}{4}$ D. $\frac{3}{2}$ E. none of these
17. $3^{2x-1} - 6(3^x) + 27 = 0$. Solve for x .
- A. 2 B. $\log_3 12$ C. 3 D. $1 + \log_3 2$ E. $1 + \frac{1}{2} \log_3 6$
18. Solve for x if $27^x - 2(3)^{2x+2} + 4(3)^{x+3} - 216 = 0$.
- A. 2 B. $\log_3 2$ C. $\log_3 6$ D. 1 E. $\log_3 4$
19. Find the coefficient of the fourth term of $(1-2x)^{\left(\frac{1}{3}\right)}$.
- A. $-\frac{40}{81}$ B. $\frac{80}{243}$ C. $\frac{80}{81}$ D. $-\frac{160}{243}$ E. $\frac{8}{9}$
20. $\log_{4n} 40\sqrt{3} = \log_{3n} 45$. Find n^3 .
- A. 4 B. 12 C. 15 D. 60 E. 75
21. Given that $\log_{10} 2 = .3010$; how many digits are in 5^{44} ?
- A. 28 B. 29 C. 30 D. 31 E. 33
22. If $2^a + 2^b = 3^c$, where a , b , and c are integers, then at least one of the three (a, b, c) must equal:
- A. -1 B. 0 C. 1 D. 2 E. $\frac{1}{2}$

23. If $\ln x^4 = (\ln x)^3$, find x .

- A. $e^2, \frac{1}{e^2}$ B. $e^2, 0$ C. $e^2, e, \frac{1}{e^2}$ D. $e^2, \frac{1}{e^2}, 0$
E. $e^2, \frac{1}{e^2}, 1$

24. For how many ordered triples of integers (a, b, c) where $11 > a > b > c > 0$ can $\log a$, $\log b$, and $\log c$ be the sides of a non-degenerate triangle?

- A. 15 B. 36 C. 75 D. 84 E. 42

25. Evaluate: $\sum_{n=0}^{\infty} \frac{\cos(nx)}{2^n}$, where $\cos(x) = \frac{1}{5}$.

- A. $\frac{6}{7}$ B. $\frac{13}{14}$ C. 1 D. $\frac{12}{11}$ E. 2