November 22, 2019

finish log SAT handout.

14. If $\log_2 ab = 5$ and $\log_3 b = 4$, then $a =$

(A) $\frac{4}{81}$

(B) $\frac{32}{81}$

(C) $\frac{4}{5}$

(D) $\frac{5}{4}$

(E) $\frac{32}{5}$

$ab = 2^5$

$b = 3^4$

$a = \frac{32}{b} = \frac{32}{81}$

16. If $\ln(x) = 1.58$, then $\ln(2x) =$

(A) 1.15
(B) 1.27
(C) 2.49
(D) 3.16
(E) 3.58

$\ln 2 + \ln x$

$= \textcircled{+}\ 1.58$

$\ln 2 + 1.58$

29. Let a, b, x, and y represent real numbers greater than 1. If $y = b^{ax}$, which of the following must be true?

(A) $x\log_a y = b$
(B) $x\log_b y = a$
(C) $\log_{ax} y = b$
(D) $\log_y b = ax$
(E) $\log_b y = ax$

$ax = \log_b y$

31. One method for finding a given number that is in an ordered list of numbers requires a computer to repeatedly split the list in half until the number is found. For a list of n numbers, the maximum number of splits is the least integer greater than or equal to $\frac{\log n}{\log 2}$. What is the maximum number of splits needed to find a given number in a list of 300,000 numbers?

(A) 3 (B) 6 (C) 15 (D) 18 (E) 19

$\frac{\log 300000}{\log 2}$

$\frac{\log 3 + 5}{\log 2}$

33. If $f(x) = \log_2 x$ for $x > 0$, then $f^{-1}(x) =$ 2^x

(A) 2^x

(B) x^2

(C) $\frac{x}{2}$

(D) $\frac{2}{x}$

(E) $\log_x 2$

38. If $(6.31)^m = (3.02)^n$, what is the value of $\frac{m}{n}$?

(A) −0.32 (B) 0.32 (C) 0.48 (D) 0.60 (E) 1.67

$\frac{m \ln 6.31}{n} = \ln 3.02$

$m \ln 6.31 = n \ln 3.02$

$\frac{m}{n} = \frac{\ln 3.02}{\ln 6.31}$

$\frac{m}{n} = \log_{6.31} 3.02 = \frac{\ln 3.02}{\ln 6.31}$

45. If $\log_a 3 = x$ and $\log_a 5 = y$, then $\log_a 45 =$

(A) $2x + y$
(B) $x^2 + y$
(C) $x^2 y$
(D) $x + y$
(E) $9x + y$

$\log_a 3^2 \cdot 5$

$= 2\log_a 3 + \log_a 5$

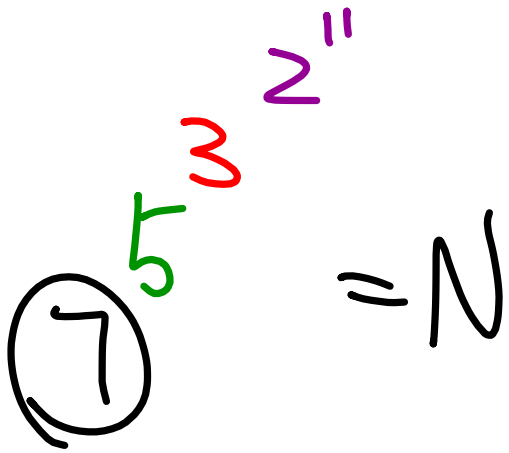
$= 2x + y$

Exercise 1 Suppose that

$$\log_2(\log_3(\log_5(\log_7(N)))) = 11.$$

How many different prime numbers are factors of N?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 7



Exercise 2 Suppose that

$$\log_2(\log_2(\log_2(x))) = 2.$$

How many digits are in the base-10 representation for x?

(A) 5 **(B)** 7 **(C)** 9 **(D)** 11 **(E)** 13

$2^{10} = 1024$

$2^2 = 4$

$2^4 = 16$

2^{16}

$2^6 = 64$

$2^{10} \cdot 2^6 = 1024 \cdot 64 \approx 64000$

Exercise 3 How many positive integers b have the property that $\log_b 729$ is also a positive integer?

(A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

$= c$

int

$b = 3^a$

$b^c = 729$

$b^c = (3^a)^c$

$= 3^6$

int

$= 3^{ac}$

$ac = 6$ ..

1	6
2	3
3	2
6	1