For this test, the answer choice “E) NOTA” means none of the answers is correct.

Have a *log* of fun!

1. Which of the following does not equal the number *e*?

 A)  B)  C)  D) 2.718 E) NOTA

2. A circle has a radius of  and a circumference of. What is?

 A)  B)  C)  D)  E) NOTA

3. Solve for  in terms of *y* when 

 A)  B)  C)  D)  E) NOTA

4. The number of digits in the number  is

 A) 13 B) 14 C) 15 D) 16 E) NOTA

5. What function is graphed below?



A) 

B) 

C) 

D) 

E) NOTA

6. Solve for x: 

 A) 3 B)  C) *e*  D) 1 E) NOTA

7. If , evaluate 

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

8. Solve for x: 

A) 10 B) 0 C) 1 D) -1 E) NOTA

9. How many of the following statements are true?

1.  f. 
2.  g. 
3.  h. 
4.  i. 
5.  j. 

A) 3 B) 4 C) 5 D) 6 E) NOTA

10. The numbers , ,  are the first three terms in an arithmetic sequence, and the eighth term is . What is *n*?

 A) 42 B) 68 C) 80 D) 112 E) NOTA

11. How many real values of *x* make the following statement true? 

 A) 0 B) 1 C) 2 D) 3 E) NOTA

12. According to the standard convention of exponentiation, . If the order of exponentiations performed is changed, how many other values are possible?

A) 0 B) 1 C) 2 D) 3 E) NOTA

13. The super-root is the inverse relation of a tetration (iterated exponentiation) with respect to the base. If , then *y* is the nth super-root of x. For instance, 65,536, where 2 is the 4th super-root of 65,536. Using this information, evaluate .

 A) 265,532 B) 265,520 C) 65,532 D) 65, 520 E) NOTA

14. Solve for *x* when: 

 A)  B)  C)  D)  E) NOTA

15. Determine the value of if and .

 A) 3 B) 8 C) 16 D) 32 E) NOTA

16. Simplify to exponential form: 

A)  B)  C)  D)  E) NOTA

17. If  and , find the sum of all of possible values of tan *x*.

 A) 0 B) 2 C) 4 D) 8 E) NOTA

18. Evaluate the following expression to the nearest whole integer:



 A) 7 B) 8 C) 9 D) 10 E) NOTA

19. Let *S* represent the sum of the base 10 logarithms of all the factors of *.* What integer is closest to *S* ?

 A) 64 B) 141 C) 224 D) 373 E) NOTA

*Questions 20 and 21 pertain to the following prompt:*

Dr. Morris jumps out of an airplane a reasonable height off the ground. The air resistance he experiences is proportional to his velocity, and it can be shown that the downward velocity of Dr. Morris at time *t* is given by , where *t* is measured in seconds and is measured in feet per second (ft/s).

20. Find Dr. Morris’s initial velocity in ft/s.

A) 80 B) 40 C) 14.5 D) 0 E) NOTA

21. The maximum velocity of a falling object with wind resistance is called its *terminal velocity*. Let  represent Dr. Morris’s terminal velocity in ft/s. Now, find , and let this result be represented by . Calculate .

A)  B)  C)  D)  E) NOTA

22. Solve for *x*: 

 A)  B)  C)  D)  E) NOTA

23. Pitch (frequency of notes) in music is based on a logarithmic scale. Two tones an octave apart have frequencies differing by a factor of two, like middle C (256 Hz) and the next C up (512 Hz). An octave, in music, is divided by 12 logarithmic intervals known as semitones. For example, the change in frequency from G to G# is one semitone.

One octave:

 C C# D D# E F F# G G# A A# B C 256Hz 512 Hz

Knowing that the musical scale is logarithmic, what note corresponds to a pitch of 384 Hz using regular rounding rules? (HINT: use a geometric sequence and)

A) F B) F# C) G D) G# E) NOTA

24.  is equivalent to which of the following?

A)  B)  C)  D)  E) NOTA

25. Rationalize the denominator of the following expression: 

 A)  B)  C)  D)  E) NOTA

26. Evaluate: 

 A)  B)  C)  D)  E) NOTA

27. Log-polar coordinates in the plane are given as the ordered pair (ρ,θ), where ρ is the natural logarithm of the distance of the given point to the origin and θ is the angle between a line of reference (the x-axis) and the line through the origin and the point.

The following formulas convert between log-polar and Cartesian:

  

Using this information, what is the equation of the circle  in log-polar form?

A) ρ=1 B) ρ=2 C) ρ=*e* D) ρ=2*e* E) NOTA

28. Evaluate 

 A)  B)  C)  D)  E) NOTA

29. How many positive integers *a* have the property that  is a positive integer?

 A) 2 B) 3 C) 4 D) 5 E) NOTA

30. A googol is 10100 and a googolplex is 10googol. Find.

A) 100 B) 400 C) 10 D) 4 E) NOTA