NOTA means "**none of these answers**"

1. The seven-digit number that represents the sum of the first 1996 positive even integers contains each of the ten digits except

   A. 0, 2, and 3 B. 2, 4, and 6 C. 4, 5, and 7 D. 4, 6, and 7 E. NOTA

2. If S is the sum of the first 1996 positive integers, which of the following statements, relative to S, is **not** true?

   A. The left two digits are 1 and 9.

   B. The sum of the digits is a perfect number.

   C. The unit's digit is a perfect number

   D. The middle digit is a even number.

   E. NOTA

3. Given the Fibonacci sequence: 1, 1, 2, 3, 5, . . . $F_1 = 1$, $F_2 = 1$ and for $n > 0$, $F_{n+2} = F_n + F_{n+1}$. Which of the following is/are true?

   I. $F_{12} = 12^2$.
   II. F_{13} is a prime number.
   III. F_{16} is an even number.

   A. I only B. I and II only C. II and III only

   D. I, II , and III E. NOTA

4. If a number is selected at random from the set of the first fifty Fibonacci numbers, the probability that that number is odd is

   A. $\frac{8}{25}$ B. $\frac{17}{25}$ C. $\frac{37}{50}$ D. $\frac{39}{50}$ E. NOTA

5. The fiftieth term of the arithmetic sequence 7, 4.5, 2. , . . . is

   A. -118.5 B. -115.5 C. -111 D. -108.5 E. NOTA

6. The positive geometric mean of 499 and 1996 is

A. divisible by 9 B. a perfect square C. an irrational number

D. less than 1,000 E. NOTA

7. $\sum_{k=1}^{100} 5 =$

A. 0 B. 5 C. 500 D. 505 E. NOTA

8. The measures of the seven angles of a convex heptagon are in arithmetic progression. If the measure of the smallest angle is 101° then the largest angle, to the nearest degree, has a measure of

A. 108° B. 147° C. 156° D. 161° E. NOTA

9. Consider the geometric series $1996^{10} + 1996^{20} + 1996^{30} + 1996^{40}$. The unit's digit of the sum of this series is

A. 0 B. 4 C. 6 D. 8 E. NOTA

10. $\sum_{n=1}^{8}(3n+1) - \sum_{n=1}^{8} 3n+1 =$

A. 0 B. 7 C. 8 D. 9 E. NOTA

11. The first three terms of a given geometric sequence are $\sqrt{2}$, $\sqrt[3]{2}$, $\sqrt[6]{2}$. The fourth term of this sequence is

A. 1 B. $\sqrt[7]{2}$ C. $\sqrt[8]{2}$ D. $\sqrt[9]{2}$ E. NOTA

12. An equilateral triangle has a side of length 4. Line segments join the midpoints of the sides to form a second triangle. Then, line segments join the midpoints of the sides of the second triangle to form a third triangle. If this process continues, what is the limiting sum of the perimeters of the triangles so formed?

A. 24 B. 48 C. 72 D. 96 E. NOTA

13. If i is the imaginary unit then $i + i^2 + i^3 + \ldots + i^n + \ldots + i^{1996} =$

A. $-i$ B. -1 C. 0 D. 1 E. NOTA

14. The infinite geometric series: $a + ar + ar^2 + \ldots + ar^{n-1} + \ldots$, has a finite sum if and only if

A. $r \neq 0$ B. $r \leq 1$ C. $|r| < 1$ D. $|r| \leq 1$ E. NOTA

15. $\sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n =$

A. 1 B. $\frac{3}{2}$ C. $\frac{4}{3}$ D. 3 E. NOTA

16. $\sum_{k=0}^{10} {}_{10}C_k =$

A. $2^9 - 1$ B. 2^9 C. 2^{10} D. $2^{10} + 10$ E. NOTA

17. A digital clock displays "1:23" and one notices that the three digits form an arithmetic sequence. How many times within the next hour are digits displayed in an arithmetic sequence?

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

18. For the sequence $a_n = \frac{10^n}{n!}$, which of the following is/are true?

I. $a_9 = a_{10}$
II. $a_{n+1} \geq a_n$ for all n
III. $a_n \leq 3000$ for all n

A. I only B. I and II only C. I and III only

D. I, II, and III E. NOTA

19. The first term of a given arithmetic sequence is 19 and the second term is 96. The first term of this sequence which exceeds 1996 is the

A. 24th B. 25th C. 26th D. 27th E. NOTA

20. The value of $\sum_{n=0}^{4} \frac{(-1)^n}{n!}$ to the nearest hundredth is

A. -0.37 B. 0.38 C. 1.91 D. 2.71 E. NOTA

21. When the repeating decimal 0.272727... is written in reduced fractional form, the sum of the numerator and the denominator is

A. 10 B. 15 C. 21 D. 126 E. NOTA.

22. Consider this program for the Sharp EL-9300C graphics calculator

```
n = 1
s = 0
Label 1
k = 2n -3
s = s + k
n = n + 3
If n < 9 Goto 1
Print s
```

When the program is executed, the output is

A. 15 B. 20 C. 48 D. 80 E. NOTA

23. For the given arithmetic sequence, written in Roman numerals, IV, VIII, XII, . . ., the Cth term is

A. CD B. DC C. CM D. MC E. NOTA

24. $\frac{4^2+8^2+12^2+...+1992^2+1996^2}{1^2+2^2+3^2+...+498^2+499^2} =$

A. 4 B. 16 C. 96 D. 1996 E. NOTA

25. $\sum_{k=1}^{n} \log_2 k =$

A. $\log_2 n^n$ B. $\log_2 n!$ C. $\log_2 (n+1)$

D. $\log_2 \frac{n(n+1)}{2}$ E. NOTA

26. If $\sum_{n=1}^{1996} n^3 = S$, then the number of digits in S is

A. 10 B. 11 C. 12 D. 13 E. NOTA

27. The sum of the first n positive even integers minus the sum of the first n odd positive integers is

A. n B. 2n C. 3n D. n^2 E. NOTA

28. Given two distinct positive integers, which of the following is/are true?

I. The arithmetic mean is always greater than the positive geometric mean.
II. The harmonic mean is always greater than the positive geometric mean.
III. The arithmetic mean is always greater than the harmonic mean.

A. I only B. I and III only C. II and III only

D. I, II and III E. NOTA

29. If $[k]$ equals the greatest integer which does not exceed k, then $\sum_{n=1}^{18} [\sqrt{n}] =$

A. 46 B. 50 C. 54 D. 58 E. NOTA

30. If a ball is dropped from a height of 78 feet and continually rebounds 0.75 of the height it falls, what is the total distance that the ball will travel?

A. 312 feet B. 546 feet C. 624 feet D. 1092 feet E. NOTA