1. Evaluate $\sum_{k=3}^{24}(-2k+5)$.

A. −484   B. −462   C. −456   D. −442   E. NOTA

2. A rectangle with width l and length w is constructed so that the ratio of l to w is equal to the ratio of w to $l-w$. Find the ratio of l to w.

A. $\dfrac{-1+\sqrt{5}}{2}$ B. $\dfrac{2+\sqrt{5}}{2}$ C. $\sqrt{5}$ D. $\dfrac{1+\sqrt{5}}{2}$ E. NOTA

3. Find the sum of the first five terms of any geometric series such that $a_1=17$ and $a_5=272$, given that all the terms of the sequence are real.

A. 17 or $17(3)^4$ B. 187   C. −17   D. 187 or 527   E. NOTA

4. A farmer is told that the amount of algae in his pond is doubling each day and that the pond will be completely covered after 30 days. What fractional part of the pond will still be clear after 20 days?

A. $\dfrac{1}{1024}$ B. $\dfrac{511}{1024}$ C. $\dfrac{1023}{1024}$ D. $\dfrac{1}{3}$ E. NOTA

5. Evaluate: $\sqrt{6+\sqrt{6+\sqrt{6+...}}}$

A. 2   B. $\sqrt{6}$ C. 3   D. 6   E. NOTA

6. If $f(x)=(1-x)^2+(2-x)^2+(3-x)^2+(4-x)^2+...(20-x)^2$, find the value of x that minimizes $f(x)$.

A. 9   B. 19/2   C. 10   D. 21/2   E. NOTA

7. What is the value of the least term of the Fibonacci Sequence which has a zero in the units digit? The sequence begins 1,1,2,3,5,…

A. 510   B. 490   C. 380   D. 360   E. NOTA

8. Evaluate $\sum_{k=1}^{20}\left(\sin\left(\dfrac{4k-3}{2}\right)\pi\right)$.

A. 20   B. 10   C. 1   D. 0   E. NOTA

9. The sequence $\sqrt{3}, \sqrt[3]{3}, \sqrt[6]{3},...$ is an example of a(n)

A. Arithmetic sequence   B. Fibonacci sequence   C. Geometric sequence
D. Harmonic sequence   E. NOTA

10. When the repeating decimal .4636636636... is expressed as a completely reduced fraction, find the sum of the numerator and denominator.

A. 378   B. 2437   C. 4874   D. 7311   E. NOTA

11. The proportion of even Fibonacci numbers is closest to which unit fraction?

A. $\dfrac{1}{2}$ B. $\dfrac{1}{3}$ C. $\dfrac{1}{4}$ D. $\dfrac{1}{5}$ E. NOTA

12. In simplest form, $\left(1-\dfrac{1}{3}\right)\left(1-\dfrac{1}{4}\right)\left(1-\dfrac{1}{5}\right)\left(1-\dfrac{1}{6}\right)...\left(1-\dfrac{1}{n}\right)$ where defined, equals

A. $\dfrac{1}{n}$ B. $\dfrac{2}{n}$ C. $\dfrac{2(n-1)}{n}$ D. $\dfrac{2}{n(n+1)}$ E. NOTA

13. Find the sum of the absolute values of the coefficients in the expansion of $(a-3b)^7$.

A. 2^7 B. 3^7 C. $2^7 \bullet 3^3$ D. 2^{14} E. NOTA

14. How many integers between 1 and 1993 are evenly divisible by 2 or 3 but not both?

A. 664   B. 996   C. 1328   D. 1660   E. NOTA

15. Group the even numbers as follows: $\{0\}, \{2,4\}, \{6,8,10\}, \{12,14,16,18\},...$
Find the sum of the elements in the 40th set.

A. 59,280   B. 62,400   C. 63,960   D. 68,880   E. NOTA

16. Given an arithmetic sequence whose first term is π and whose second term is e, find the 10th term of the sequence.

A. $9e-9\pi$ B. $9e-8\pi$ C. $9\pi-9e$ D. $9\pi-8e$ E. NOTA

17. Evaluate: $\displaystyle\sum_{n=2}^{\infty}\dfrac{1}{n(n+2)}$.

A. $\dfrac{5}{12}$ B. $\dfrac{1}{2}$ C. $\dfrac{3}{4}$ D. $\dfrac{5}{6}$ E. NOTA

18. Consider the matrix $\begin{bmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{bmatrix}$. The value of the determinant of this matrix will be zero if the

sequence $a_1, a_2, a_3, a_4 ..., a_9$ is a(n)

I. Arithmetic   II. Geometric   III. Harmonic

A. I only   B. II only   C. I and II only   D. I and III only   E. NOTA

19. Evaluate: $1 + \cfrac{2}{1 + \cfrac{2}{1 + \cfrac{2}{1 + ...}}}$

A. 2   B. 2.5   C. $1 + \sqrt{3}$ D. 3   E. NOTA

20. Evaluate the limit of this product of an infinite number of terms:
$$(3)\left(\sqrt[3]{9}\right)\left(\sqrt[9]{27}\right)\left(\sqrt[27]{81}\right)\left(\sqrt[81]{243}\right)...$$

A. 2.25   B. $3\sqrt{3}$ C. $9\sqrt[4]{3}$ D. $81\sqrt{3}$ E. NOTA

21. If the arithmetic mean of x and y equals their harmonic mean, then, where defined,

A. $x + y = 0$ B. $x = 2y$ C. $xy = 0$
D. $xy = 1$ E. NOTA

22. An auditorium has 64 seats in the last row in the back. Each of the remaining rows has 3 fewer seats than the row before it. If there are 18 rows of seats, how many seats are in the first row?

A. 10   B. 13   C. 16   D. 19   E. NOTA

23. What is the remainder when 2^{71} is divided by 9?

A.7   B.8   C. 5   D. 4   E. NOTA

24. The average of 100 numbers is 82.28. The average of 81 of these numbers is 80. Find the average of the other 19.

A. 91   B. 92   C. 93   D. 94   E. NOTA

25. Will, Jason and Louis are playing a game with 2 fair dice. The first player to roll doubles wins. If Will rolls first, then Jason, then Louis, then Will again, and so on until someone wins, what is the probability that Jason will win?

A. $\dfrac{30}{91}$ B. $\dfrac{1}{3}$ C. $\dfrac{36}{91}$ D. $\dfrac{5}{11}$ E. NOTA

26. Find the sum of the first 30 terms of the series: $1-2+2-4+3-6+4-8+....$

A. -120 B. -105 C. -465 D. -15 E. NOTA

27. The second term of a geometric sequence is 4 and the sixth term is 16. Find the fourth term if the ratio of consecutive terms is a real number.

A. 10   B. 8   C. $8\sqrt{2}$ D. 12   E. NOTA

28. Terms a,b,c,d are the first four terms of an arithmetic sequence with $a<b<c<d$. If $d-a=r$, what is $c-a$?

A. $\dfrac{r}{3}$ B. $\dfrac{r}{2}$ C. $\dfrac{2r}{3}$ D. $\dfrac{3r}{4}$ E. NOTA

29. Evaluate $\displaystyle\prod_{i=1}^{20}\left(\dfrac{i}{i+1}\right)$.

A. $\dfrac{1}{20}$ B. $\dfrac{1}{21}$ C. $\dfrac{2}{19}$ D. $\dfrac{1}{10}$ E. NOTA

30. Which of the following is equal to $\dfrac{1}{1+2x^2}$ for $-\dfrac{\sqrt{2}}{2}<x<\dfrac{\sqrt{2}}{2}$?

A. $1-2x^2+4x^4-8x^8+...$
B. $1+2x^2+4x^4+8x^8+...$
C. $1+2x^2+4x^4+6x^6+...$
D. $1-2x^2+4x^4-6x^6+...$
E. NOTA