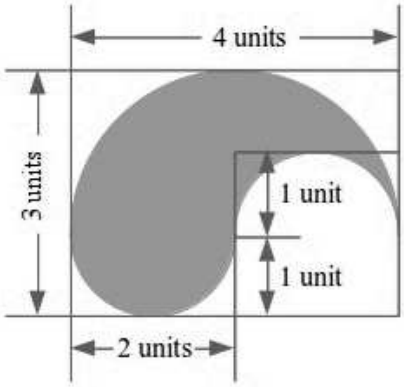
1. The value of $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+\cdots+\frac{1}{\log_{2017} n}$ (where $n = 2017!$) is

   (A) 1 (B) 2 (C) 2017 (D) none of these.

2. The area of the shaded region in the following figure (all the arcs are circular) is



   (A) π (B) 2π (C) 3π (D) $\frac{9}{8}\pi$.

3. If $2f(x) - 3f(\frac{1}{x}) = x^2$ $(x \neq 0)$, then $f(2)$ is

   (A) $\frac{2}{3}$ (B) $-\frac{3}{2}$ (C) $-\frac{7}{4}$ (D) $\frac{5}{4}$.

4. If A is a 3×3 matrix satisfying $A^3 - A^2 + A - I = O$ (where O is the zero matrix and I is the identity matrix) then the value of A^4 is

   (A) A (B) O (C) I (D) none of these.

5. The sum of the squares of the roots of $x^2 - (a-2)x - a - 1 = 0$ becomes minimum when a is

   (A) 0 (B) 1 (C) 2 (D) 5.

6. Let $f(x) = \frac{x-1}{x+1}$, $f^{k+1}(x) = f(f^k(x))$ for all $k = 1, 2, 3, \ldots, 99$. Then $f^{100}(10)$ is

(A) 1 (B) 10 (C) 100 (D) 101.

7. If $\begin{vmatrix} 10! & 11! & 12! \\ 11! & 12! & 13! \\ 12! & 13! & 14! \end{vmatrix} = k(10!)(11!)(12!)$, then the value of k is

(A) 1 (B) 2 (C) 3 (D) 4.

8. If x, y, z are in A.P. and $a > 1$, then a^x, a^y, a^z are in

(A) A.P. (B) G.P. (C) H.P. (D) none of these.

9. The solution of $\log_5(\sqrt{x+5} + \sqrt{x}) = 1$ is

(A) 2 (B) 4 (C) 5 (D) none of these.

10. The value of the Boolean expression (with usual definitions) $(A'BC')' + (AB'C)'$ is

(A) 0 (B) 1 (C) A (D) BC.

11. The coefficient of x^6y^3 in the expression $(x + 2y)^9$ is

(A) 84 (B) 672 (C) 8 (D) none of the these.

12. Two sets have m and n elements. The number of subsets of the first set is 96 more than that of the second set. Then the values of m and n are

(A) 8 and 6 (B) 7 and 6 (C) 7 and 5 (D) 6 and 5.

13. The value of $\frac{x}{1-x^2}+\frac{x^2}{1-x^4}+\frac{x^4}{1-x^8}+\frac{x^8}{1-x^{16}}$ is

(A) $\frac{1}{1-x^{16}}$ (B) $\frac{1}{1-x^{12}}$
(C) $\frac{1}{1-x}-\frac{1}{1-x^{16}}$ (D) $\frac{1}{1-x}-\frac{1}{1-x^{12}}$.

14. If a, b, c are the sides of a triangle such that $a : b : c = 1 : \sqrt{3} : 2$, then $A : B : C$ (where A, B, C are the angles opposite to the sides of a, b, c respectively) is

(A) 3 : 2 : 1 (B) 3 : 1 : 2 (C) 1 : 2 : 3 (D) 1 : 3 : 2.

15. The number of solutions of

$$\tan^{-1}(x-1)+\tan^{-1}(x)+\tan^{-1}(x+1)=\tan^{-1}(3x) \text{ is}$$

(A) 1 (B) 2 (C) 3 (D) 4.

16. If $\cos x = \frac{1}{2}$, the value of the expression $\frac{\cos 6x+6\cos 4x+15\cos 2x+10}{\cos 5x+5\cos 3x+10\cos x}$ is

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{1}{4}$ (D) 0.

17. If $\cos^2 x+\cos^4 x = 1$, then $\tan^2 x+\tan^4 x$ is equal to

(A) 1 (B) 0 (C) 2 (D) none of these.

18. If a, b, c are the sides of ΔABC, then $\tan\frac{B-C}{2}\tan\frac{A}{2}$ is equal to

(A) $\frac{b+c}{b-c}$ (B) $\frac{b-c}{b+c}$ (C) $\frac{c-b}{c+b}$ (D) none of these.

19. The angle between the tangents drawn from the point $(-1, 7)$ to the circle $x^2+y^2=25$ is

(A) $\tan^{-1}(\frac{1}{2})$ (B) $\tan^{-1}(\frac{2}{3})$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{3}$.

20. If the coordinates of the middle point of the portion of a line intercepted between the coordinate axes are $(3, 2)$, then the equation of the straight line is

(A) $2x + 3y = 12$ (B) $3x + 2y = 0$

(C) $2x + 3y = 0$ (D) $3x + 2y = 12$.

21. If a, b, c are in A.P., then the straight line $ax + by + c = 0$ will always pass through the point whose coordinates are

(A) $(1, -2)$ (B) $(1, 2)$ (C) $(-1, 2)$ (D) $(-1, -2)$.

22. Let $A_1, A_2, A_3, \ldots, A_n$ be n independent events such that $P(A_i) = \frac{1}{i+1}$ for $i = 1, 2, 3, \ldots, n$. The probability that none of $A_1, A_2, A_3, \ldots, A_n$ occurs is

(A) $\frac{n}{n+1}$ (B) $\frac{1}{n+1}$ (C) $\frac{n-1}{n+1}$ (D) none of these.

23. A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability of choosing a non-zero determinant is

(A) $\frac{3}{16}$ (B) $\frac{3}{8}$ (C) $\frac{1}{4}$ (D) none of these.

24. The differential equation $x\frac{dy}{dx} - y = x^3$ with $y(0) = 2$ has

(A) unique solution (B) no solution

(C) infinite number of solutions (D) none of these.

25. If $f(x) = \begin{vmatrix} 2\cos^2 x & \sin 2x & -\sin x \\ \sin 2x & 2\sin^2 x & \cos x \\ \sin x & -\cos x & 0 \end{vmatrix}$,

then $\int_0^{\frac{\pi}{2}} [f(x) + f'(x)]dx$ is

(A) π (B) $\frac{\pi}{2}$ (C) 0 (D) 1.

26. The value of $\lim_{n\to\infty}\left(\frac{1}{1-n^2}+\frac{2}{1-n^2}+\cdots+\frac{n}{1-n^2}\right)$ is

(A) 0 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) none of these.

27. The limit of the sequence $\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \ldots$ is

(A) 1 (B) 2 (C) $2\sqrt{2}$ (D) ∞.

28. A basket contains some white and blue marbles. Two marbles are drawn randomly from the basket without replacement. The probability of selecting first a white and then a blue marble is 0.2. The probability of selecting a white marble in the first draw is 0.5. What is the probability of selecting a blue marble in the second draw, given that the first marble drawn was white?

(A) 0.1 (B) 0.4 (C) 0.5 (D) 0.2.

29. The area (in square unit) of the portion enclosed by the curve $\sqrt{2x}+\sqrt{2y}=2\sqrt{3}$ and the axes of reference is

(A) 2 (B) 4 (C) 6 (D) 8.

30. If $f(x)=e^{5x}$ and $h(x)=f''(x)+2f'(x)+f(x)+2$ then $h(0)$ equals

(A) 38 (B) 8 (C) 4 (D) 0.

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