MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 1

Mathematics

1. If the roots of the equation $ax^2 + bx + c = 0$ are in the ratio $m : n$ then

A. $mnb^2 = ac(m+n)^2$

B. $b^2(m+n) = mn$

C. $m + n = b^2 mn$

D. $mnc^2 = ab(m+n)^2$

Answer: A

Watch Video Solution

2. The domain of definition of the function $y = 3e^{\sqrt{x^2 - 1}} \log(x - 1)$ is

A. $(1, \infty)$

B. $[1, \infty)$

C. $R - \{1\}$

D. $(- \infty, \ - 1) \cup (1, \infty)$

Answer: A

Watch Video Solution

3. The value of $\int_{-1}^{1} (x - [x])dx$, (where [.] denotes greatest integer function)is

A. 0

B. 1

C. 3

D. 2

Answer: B

Watch Video Solution

4. A flag staff of 5m high stands on a building of 25m high. At an observer at a height of 30 m. The flag staff and the building subtend equal angles. The distance of the observer from the top of the flag staff is

A. $\frac{5\sqrt{3}}{2}$m

B. $5\sqrt{\frac{3}{2}}m$

C. $5\sqrt{\frac{2}{3}}m$

D. None of these

Answer: B

Watch Video Solution

5. If $R = \{(x, y) : x, y \in z, x^2 + y^2 \leq 4\}$ is a relation defined on the set z of integers, then write domain and range.

A. $\{0, 1, 2\}$

B. $\{0, -1, -2\}$

C. $\{-2, -1, 0, 1, 2\}$

D. None of these

Answer: C

Watch Video Solution

6. What will be the remainder when 5^{97} is divided by 52

A. 3

B. 5

C. 4

D. 0

Answer: B

Watch Video Solution

7. If $y=4x-5$ is a tangent to the curve $y^2=px^3+q$ at (2, 3), then

A. $(2,7)$

B. $(-2,7)$

C. $(-2,-7)$

D. $(2,-7)$

Answer: D

Watch Video Solution

8. The number of discontinuities of the greatest integer function $f(x) = [x], x \in \left(-\frac{7}{2}, 100\right)$ is equal to

A. 104

B. 102

C. 104

D. 103

Answer: D

Watch Video Solution

9. The number of ways of dividing 15 men and 15 women into 15 couples each consisting a man and a woman is

A. 1960

B. $15!$

C. $(15!)^2$

D. $14!$

Answer: B

Watch Video Solution

10. If the general solution of the differential equation $y' = \frac{y}{x} + \phi\left(\frac{x}{y}\right)$, for some function ϕ is given by $y \ln|cx| = x$, where c is an arbitray constant, then $\phi(2)$ is equal to (here $y' = \frac{dy}{dx}$)

A. -4

B. $-\frac{1}{4}$

C. $\frac{1}{4}$

D. 4

Answer: B

Watch Video Solution

11. If $\sin^{-1}\frac{1}{3}+\sin^{-1}\frac{2}{3}=\sin^{-1}x$, then the value of x is

A. 0

B. $\frac{\left(\sqrt{5}-4\sqrt{2}\right)}{9}$

C. $\frac{\left(\sqrt{5}+4\sqrt{2}\right)}{9}$

D. $\frac{\pi}{2}$

Answer: C

Watch Video Solution

12. If $x \neq y$, then for every natural number n, $x^n - y^n$ is divisible by

A. $x^2 - y^2$

B. $x + y$

C. $x - y$

D. None of these

Answer: C

Watch Video Solution

13. The area bounded by the curves $y=(x-1)^2, y=(x+1)^2$ and $y=\frac{1}{4}$ is

A. $\frac{1}{3}$ sq unit

B. $\frac{2}{3}$ sq unit

C. $\frac{1}{4}$ sq unit

D. $\frac{1}{5}$ sq unit

Answer: A

Watch Video Solution

14. Number of roots of $\cos^2 x+\frac{\sqrt{3}+1}{2}\sin x-\frac{\sqrt{3}}{4}-1=0$ which lie in the interval $[-\pi, \pi]$ is

A. 2

B. 4

C. 6

D. 8

Answer: B

Watch Video Solution

15. Suppose that the side lengths of a triangles are three consecutive integers and one of the angles is twice another. The number of such triangles is/are

A. 1

B. 0

C. 4

D. 2

Answer: A

Watch Video Solution

16. Let $x = 33^n$. The index n is given a positive integral value at random.

The probability that the value of x will have 3 in the units place is

A. $\frac{1}{3}$

B. $\frac{1}{4}$

C. $\frac{1}{5}$

D. $\frac{1}{2}$

Answer: B

Watch Video Solution

17. If $y = \log_{10} x + \log_x 10 + \log_x x + \log_{10} 10$ then what is $\left(\frac{dy}{dx}\right)_{x=10}$

equal to?

A. $\frac{1}{x\log_e 10}-\frac{\log_e 10}{x(\log_e x)^2}$

B. $\frac{1}{x\log_e 10}-\frac{1}{x\log_{10} e}$

C. $\frac{1}{x\log_e 10}-\frac{1}{(\log_e x)^2}$

D. None of these

Answer: A

Watch Video Solution

18. If $|z|\geq 3,$ then determine the least value of $\left|z+\frac{1}{z}\right|$.

A. $\frac{3}{8}$

B. $\frac{8}{5}$

C. $\frac{8}{3}$

D. $\frac{5}{8}$

Answer: C

Watch Video Solution

19. If a, b, c, d, e, f are in A.P., then $e - c$ is equal to

A. $2(c - a)$

B. $2(d - c)$

C. $2(f - d)$

D. $d - c$

Answer: B

Watch Video Solution

20. $\int \frac{\log(x+1) - \log x}{x(x+1)} dx$ is equal to :

A. $-\frac{1}{2}\left[\ln\left(\frac{x+1}{x}\right)\right]^2 + C$

B. $-\left[\{\ln(x+1)\}^2 - (Inx)^2\right] + C$

C. $-\ln\left[\ln\left(\frac{x+1}{x}\right)\right] + C$

D. $-\ln\left(\frac{x+1}{x}\right)+C$

Answer: A

Watch Video Solution

21. If $f(X)$ is a polynomial satisfying $f(x)f\left(\frac{1}{x}\right)=f(x)+f\left(\frac{1}{x}\right)$ and $f(2)>1$, then $\lim_{x\to 1} f(x)$ is

Watch Video Solution

22. Let $A=\begin{bmatrix}1&0&0\\0&1&1\\0&-2&4\end{bmatrix}, I=\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$ and $A^{-1}=\left[\frac{1}{6}(A^2+cA+dI)\right]$. Then value of c and d are

A. $(6,\ -11)$

B. $(6, 11)$

C. $(-6, 11)$

D. $(6, -11)$

Answer: B

Watch Video Solution

23. The least value of the quadratic polynomial, $f(x) = (2p^2 + 1)x^2 + 2(4p^2 - 1)x + 4(2p^2 + 1)$ for real values of p and x is

Watch Video Solution

24. If A,B,C are in A.P and $B = \frac{\pi}{4}$ then $\tan A \tan B \tan C =$

Watch Video Solution

25. Find the distance of the point $(-1, 1)$ from the line $12(x + 6) = 5(y - 2)$.

Watch Video Solution

26. If the 2^{nd}, 5^{th} and 9^{th} terms of a non-constant arithmetic progression are in geometric progession, then the common ratio of this geometric progression is

A. 1

B. $\frac{7}{4}$

C. $\frac{8}{5}$

D. $\frac{4}{3}$

Answer: D

Watch Video Solution

27. All possible numbers are formed using the digits $1, 1, 2, 2, 2, 2, 3, 4, 4$ taken all at a time. The number of such numbers in which the odd digits occupy even places is:

A. 175

B. 162

C. 180

D. 160

Answer: C

Watch Video Solution

28. Let w denote the words in the english dictionary. Define the relation R by: R = $\{(x, y) \in W \times W \mid$ words x and y have at least one letter in common}. Then R is: (1) reflexive, symmetric and not transitive (2) reflexive, symmetric and transitive (3) reflexive, not symmetric and transitive (4) not reflexive, symmetric and transitive

A. reflexive , symmetric and not transitive

B. reflexive,symmetric and transitive

C. reflexive , not symmetric and transitive

D. not reflexive , symmetric and transitive

Answer: A

Watch Video Solution

29. The value of a for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 1$ has a real solution is

A. $-\frac{2}{\pi}$

B. $\frac{2}{\pi}$

C. $-\frac{\pi}{2}$

D. $\frac{\pi}{2}$

Answer: C

Watch Video Solution

30. The general solution of the differential equation $(2x - y + 1)dx + (2y - x + 1)dy = 0$ is -

A. $x^2 + y^2 + xy - x + y = c$

B. $x^2 + y^2 - xy + x + y = c$

C. $x^2 - y^2 + 2xy - x + y = c$

D. $x^2 - y^2 - 2xy + x - y = c$

Answer: B

Watch Video Solution

31. The mean of five numbers is 0 and their variance is 2 .If three of those numbers are -1,1 and 2, then the other two numbers are

A. -5 and 3

B. -4 and 2

C. -3 and 1

D. -2 and 0

Answer: D

Watch Video Solution

32. The first integral term in the expansion of $\left(\sqrt{3}+2^{\frac{1}{3}}\right)^{9}$, is

A. 2^{nd}term

B. 3^{rd} term

C. 4^{th} term

D. 5^{th} term

Answer: C

Watch Video Solution

33. If $\cos\alpha + \cos\beta = a, \sin\alpha + \sin\beta = b$ and $\alpha - \beta = 2\theta$, then $\frac{\cos 3\theta}{\cos\theta} =$

A. $a^2 + b^2 - 2$

B. $a^2 + b^2 - 3$

C. $3 - a^2 - 3$

D. $\frac{a^2 + b^2}{4}$

Answer: B

Watch Video Solution

34. If the image of the point (1,-2,3) in the plane $2x + 3y - z = 7$ is the point (α, β, γ), then the value of $\alpha + \beta + \gamma$ is equal to

A. -6

B. 10

C. 8

D. -4

Answer: A

Watch Video Solution

35. The value of $\int \frac{dx}{x(x^n+1)}$ is equal to

A. $\frac{1}{n}\log_e\left(\frac{x^n}{x^n+1}\right)+c$

B. $\frac{1}{n}\log_e\left(\frac{x^n+1}{x^n}\right)+c$

C. $\log_e\left(\frac{x^n}{x^n+1}\right)+c$

D. None of these

Answer: A

Watch Video Solution

36. If f is a function defined as $f(x) = x^2 - x + 5, f: \left(\frac{1}{2}, \infty\right) \to \left(\frac{19}{4}, \infty\right)$, and g(x) is its inverse function, then g'(7) is equal to

A. $-\frac{1}{13}$

B. $\frac{1}{13}$

C. $\frac{1}{3}$

D. $-\frac{1}{3}$

Answer: C

Watch Video Solution

37. Let α and β be two roots of the equation $x^2 + 2x + 2 = 0$. Then $\alpha^{15} + \beta^{15}$ is equal to

A. -512

B. 128

C. 512

D. -256

Answer: D

Watch Video Solution

38. The value of f (0), such that $f(x) = \frac{1}{x^2}(1 - \cos(\sin x))$ can be made continuous at x=0 , is

A. $\frac{1}{2}$

B. 2

C. $\frac{1}{4}$

D. 4

Answer: A

Watch Video Solution

39. The locus of the centre of the circle which cuts the circle $x^2 + y^2 - 20x + 4 = 0$ orthogonally and touches the line $x = 2$ is

A. $y^2 = 16x + 4$

B. $x^2 = 16y$

C. $x^2 = 16y + 4$

D. $y^2 = 16x$

Answer: D

Watch Video Solution

40. The parabolas $y^2 = 4x$ and $x^2 = 4y$ divide the square region bounded by the lines x=4, y=4 and the coordinate axes. If S_1, S_2, S_3 are the areas of these parts numbered from top to bottom, respectively, then

A. $2:1:2$

B. $1:1:1$

C. $1:2:1$

D. $1:2:3$

Answer: B

Watch Video Solution

41. The value of

$$\lim_{x \to \infty} \frac{2x^{1/2} + 3x^{1/3} + 4x^{1/4} + \dots . nx^{1/n}}{(2x-3)^{1/2} + (2x-3)^{1/3} + \dots . + (2x-3)^{1/n}} \text{ is}$$

A. $\sqrt{2}$

B. 2

C. $\frac{1}{\sqrt{3}}$

D. 0

Answer: A

Watch Video Solution

42. If $f(x) = x^3 + 4x^2 + ax + 5$ is a monotonically decreasing function of x in the largest possible interval `(-2,-2//3), then the value of a is

A. $\lambda = 4$

B. $\lambda = 2$

C. $\lambda = -1$

D. λ has no real value

Answer: A

Watch Video Solution

43. If the angles of elevation of the top of tower from three collinear points A, B and C, on a line leading to the foot of the tower, are 30°, 45° and 60° respectively, then the ratio , $AB : BC$ is

A. $2 : 3$

B. $\sqrt{3} : 1$

C. $\sqrt{3}:\sqrt{2}$

D. $1:\sqrt{3}$

Answer: B

Watch Video Solution

44. A unit vector in the xy-plane that makes an angle of $\frac{\pi}{4}$ with the vector $\hat{i}+\hat{j}$ and an angle of with the vector $3\hat{i}-4\hat{j}$ is

A. $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

B. $\frac{\hat{i}-\hat{j}}{\sqrt{2}}$

C. $\frac{2\hat{i}-\hat{j}}{\sqrt{2}}$

D. None of these

Answer: D

Watch Video Solution

45. If $x = \frac{1-t^2}{1+t^2}$ and $y = \frac{2t}{1+t^2}$, then $\frac{dy}{dx}$ is equal to

A. $-\frac{y}{x}$

B. $\frac{y}{x}$

C. $-\frac{x}{y}$

D. $\frac{x}{y}$

Answer: C

Watch Video Solution

46. Let A be a matrix of order 3×3such that det (A)= 2 , $B = 2A^{-1}$ and $C = \frac{(adjA)}{\sqrt[3]{16}}$,then the value of $\det\left(A^3B^2C^3\right)$ is

Watch Video Solution

47. Given f(x) where

$$= \begin{cases} x|x| & \text{for} x \leq -1 \\ [x+1]+[1-x] & \text{for} -1 < x < 1, \\ -x|x| & \text{for} x \geq 1 \end{cases}$$ [.] denotes the greatest integer function. If $I = \int_{-2}^{2} f(x)dx$,then |3I| =

Watch Video Solution

48. The line $3x + 2y = 24$ meets the y-axis at A and the x-axis at B. The perpendicular bisector of AB meets the line through $(0, -1)$ parallel to the x-axis at C. If the area of triangle ABC is A , then the value of $\frac{A}{13}$ is_______

Watch Video Solution

49. The minimum number of times a fair coin needs to be tossed, so that the probability of getting at least two heads is at least 0.96, is _____.

Watch Video Solution

50. Consider the equation $x^2 + 2x - n = 0$ where $n \in N$ and $n \in [5, 100]$. The total number of different values of n so that the given equation has integral roots is

Watch Video Solution

51. The value of $I = \int_{-1}^{1} [x \sin(\pi x)] dx$ is (where [.] denotes the greatest integer function)

A. π

B. 2π

C. 0

D. $-\pi$

Answer:

Watch Video Solution

52. The area bounded by the curve $y^2 = 1 - x$ and the lines $y = \frac{[x]}{x}, x = -1, \text{ and } x = \frac{1}{2}$ is

A. $\left(\frac{3}{\sqrt{2}} - \frac{11}{6}\right)$ sq. units

B. $\left(3\sqrt{2} - \frac{11}{4}\right)$ sq. units

C. $\left(\frac{6}{\sqrt{2}} - \frac{11}{5}\right)$ sq. units

D. none of these

Answer: A

Watch Video Solution

53. The curve satisfying the differential equation $\frac{dx}{dy} = \frac{x + 2yx^2}{y - 2x^3}$ and passing through (1, 0) is given by

A. $x^2 + y^2 = 1$

B. $x^2 + y^2 + \frac{y}{x} = 1$

C. $y^2 - \frac{y}{x} - x^2 = -1$

D. $x^2 - y^2 = 1$

Answer: B

Watch Video Solution

54. The line $\frac{x}{a} + \frac{y}{b} = 1$ touches the curve $y = be^{-x/a}$ at the point

A. (0,0)

B. (0,a)

C. (0,b)

D. (b,0)

Answer: C

Watch Video Solution

55. Six distinct numbers are chosen from the first 10 natural numbers. The probability that 6 is the third largest of those chosen number is

A. $\frac{2}{7}$

B. $\frac{5}{21}$

C. $\frac{10}{63}$

D. $\frac{16}{63}$

Answer: A

Watch Video Solution

56. A plane P = 0, which is perpendicular to line $\frac{x-2}{2}=\frac{y+2}{2}=\frac{z-1}{1}$ is passing through the point at which the above line meets the plane $x+y+z=21$, then the distance of plane P = 0 from origin is

A. $\frac{7}{3}$

B. 5

C. $\frac{32}{3}$

D. $\frac{37}{3}$

Answer: D

Watch Video Solution

57. If $A^2 = A$, then $(I + A)^4$ is equal to

A. $I + 15A$

B. $1 + 7A$

C. $1 + 8A$

D. $1 + 11A$

Answer: A

Watch Video Solution

58. The mean and variance of a data set comprising 15 observations are 15 and 5 respectively. If one of the observation 15 is deleted and two new observations 6 and 8 are added to the data, then the new variance of resulting data is

A. 10.3715

B. 11.8125

C. 13.25

D. 5.7516

Answer: B

Watch Video Solution

59. If $A = \{x : x = 6^n - 5n - 1, n \in N\}$ and $B = \{x : x = 25(n - 1), n \in N\}$, then

A. A = B

B. $B \subset A$

C. $A \subseteq B$

D. $B \subseteq A$

Answer: C

Watch Video Solution

60. If $f(\tan x) = \cos 2x, x \neq (2n+1)\frac{\pi}{2}, n \in I$ then incorrect statement is

A. f(x) is an even function

B. f(x) is an odd function

C. Range of $f(x)$ is $[-1, 1]$

D. Domain of $f(x)$ is $x \in R$

Answer: A

Watch Video Solution

61. The value of $\lim_{x \to \pi} \frac{\tan(\pi \cos^2 x)}{\sin^2 x}$ is equal to

A. 1

B. π

C. $-\pi$

D. $\frac{\pi}{2}$

Answer: C

Watch Video Solution

62. If $f(x) = \left(\frac{2+x}{1+x}\right)^{1+x}$, then $f'(0)$ is equal to

A. 2 log 2

B. log 2

C. 3 log 2 - 1

D. 2 log 2 - 1

Answer: D

Watch Video Solution

63. Total number of lines touching atleast two circles of the family of four circles $x^2 + y^2 \pm 8x \pm 8y = 0$ is

A. 8

B. 10

C. 12

D. 14

Answer: D

Watch Video Solution

64. The locus of the middle points of the chords of the parabola $y^2 = 4ax$, which passes through the origin is :

A. $y^2 = ax$

B. $y^2 = 2ax$

C. $y^2 = 4ax$

D. $x^2 = 4ay$

Answer: B

Watch Video Solution

65. A flagstaff stands vertically on a pillar, the height of the flagstaff being double the height of the pillar. A man on the ground at a distance finds that both the pillar and the flagstaff subtend equal angles at his eyes. The ratio of the height of the pillar and the distance of the man from the pillar is

A. $\frac{\sqrt{3}}{1}$

B. $\frac{1}{3}$

C. $\frac{1}{\sqrt{3}}$

D. $\frac{\sqrt{3}}{2}$

Answer: C

Watch Video Solution

66. If $z = 3 - 4i$ then $z^4 - 3z^3 + 3z^2 + 99z - 95$ is equal to

Watch Video Solution

67. If the roots of the equation $x^3 + bx^2 + cx + d = 0$ are in arithmetic progression, then b, c and d satisfy the relation

A. $2b^2 - 27d = 9bc$

B. $2b^3 - 27d = 9bc$

C. $2b^2 + 27d = 9bc$

D. $2b^3 + 27d = 9bc$

Answer: D

Watch Video Solution

68. In the expression of $\left(x^{\frac{4}{5}} + x^{-\frac{1}{5}}\right)^n$, the coefficient of the 8^{th} and 19^{th} terms are equal. The term independent of x is given by

A. $.^{27}C_{21}$

B. $.^{25}C_{20}$

C. $.^{25}C_{21}$

D. $.^{27}C_{22}$

Answer: B

Watch Video Solution

69. In the interval $(0, 2\pi)$, sum of all the roots of the equation $\sin\left(\pi \log_3\left(\frac{1}{x}\right)\right) = 0$ is

A. $\frac{3}{2}$

B. 4

C. $\frac{9}{2}$

D. $\frac{13}{3}$

Answer: C

Watch Video Solution

70. There are 3 oranges, 5 apples and 6 mangoes in a fruit basket. Number of ways in which at least one fruit can be selected from the basket is

A. 168

B. 167

C. 125

D. 124

Answer: B

Watch Video Solution

71. If $\int \frac{x^{pq-p-1}}{(x^p+1)^q} dx = 2\frac{(1+x^{-p})^{1-q}}{\lambda p(q-1)} + c \quad (p, q \in N - \{1\})$, then the value of λ is (here, c is an arbitary constant)

Watch Video Solution

72. The smallest possible natural number n, for which the equation $x^2 - nx + 2014 = 0$ has integral roots, is

Watch Video Solution

73. If $f(x) = \begin{cases} \lambda\sqrt{2x+3} & 0 \le x \le 3 \\ \mu x + 12 & 3 < x \le 9 \end{cases}$ is differentiable at $x = 3$, then the value of $\lambda + \mu$ is equal to

Watch Video Solution

74. Let in ΔABC coordinates of vertex A is (0,0). Equation of the internal angle bisector of $\angle ABC$ is $x + y - 1 = 0$ and mid-point of BC is (1,3). The ordinate of vertex C is

Watch Video Solution

75. Let the maximum and minimum value of the expression $2\cos^2\theta + \cos\theta + 1$ is M and m respectively, then the value of $\left[\frac{M}{m}\right]$ is (where [.] is the greatest integer function)

Watch Video Solution

76. The function $f(x) = \tan x + \frac{1}{x}, \forall x \in \left(0, \frac{\pi}{2}\right)$ has

A. one local maximum

B. one local minimum

C. one local maximum and one minimum

D. no local maximum of minimum

Answer: B

Watch Video Solution

77. The possible values of n for which the equation $nx^2 + (2n - 1)x + (n - 1) = 0$ has roots of opposite sign is/are by

A. no value of n

B. all values of n

C. $-1 < n < 0$

D. $0 < n < 1$

Answer: D

Watch Video Solution

78. The value of the integral $I = \int_1^2 t^{[\{t\}]+t}(1+\ln t)dt$ is equal to ($[.]$ and $\{.\}$ denotes the greatest integer and fractional part function respectively)

Watch Video Solution

79. The solution of the differential equation $xdy + \frac{y}{x}dx = \frac{dx}{x}$ is (where, c is an arbitarary constant)

A. $y = 1 + ce^{1/x}$

B. $y = ce^{1/x}$

C. $y = ce^{1/x} - 1$

D. $xy = 1 - ce^{1/x}$

Answer: A

Watch Video Solution

80. In an experiment with 9 observation on x, the following results are available $\Sigma x^2 = 360$ and $\Sigma x = 34$. One observation that was 8, was found to be wrong and was replaced by the correct value 10, then the corrected variance is

A. $\frac{250}{9}$

B. 28

C. $\frac{240}{9}$

D. 26

Answer: B

Watch Video Solution

81. If two parabolas $y^2 - 4a(x-k)$ and $x^2 = 4a(y-k)$ have only one common point P, then the equation of normal to $y^2 = 4a(x-k)$ at P is

A. $y + x = 4a$

B. $y + x = 2a$

C. $y + x = 4$

D. $y + x = 2$

Answer: A

Watch Video Solution

82. If a, b & 3c are in arithmetic progression and a, b & 4c are in geometric progression, then the possible value of $\frac{a}{b}$ are

A. $\left\{\frac{2}{3}, 2\right\}$

B. $\left\{\frac{3}{2}, \frac{1}{2}\right\}$

C. $\left\{\frac{2}{3}, \frac{3}{2}\right\}$

D. $\left\{\frac{1}{2}, 2\right\}$

Answer: B

Watch Video Solution

83. The number of terms in the expansion of $\left(5^{\frac{1}{6}} + 7^{\frac{1}{9}}\right)^{1824}$ which are integers is

A. 100

B. 101

C. 102

D. 103

Answer: C

Watch Video Solution

84. The number of ways in which 10 balls can be selected from 10 identical green balls, 10 identical blue balls and 9 idenitcal red balls are

A. 63

B. 64

C. 65

D. 66

Answer: C

Watch Video Solution

85. Consider the function $f(x) = \cos^{-1}([2^x]) + \sin^{-1}([2^x] - 1)$, then (where $[.]$ represents the greatest integer part function)

A. Domain of f(x) is $x \in (-\infty, 0]$

B. Range of $f(x)$ is singleton

C. $f(x)$ is an even function

D. $f(x)$ is an odd function

Answer: B

Watch Video Solution

86. If A & B are two sets such that $n(A \times B) = 60 \& n(A) = 12$ also $n(A \cap B) = K$, then the sum of maximum & minimum possible value of K is

A. 17

B. 12

C. 5

D. 7

Answer: C

Watch Video Solution

87. The value of $\lim_{x \to 0^-} \frac{2^{1/x} + 2^{3/x}}{3\left(2^{1/x}\right) + 5\left(2^{3/x}\right)}$ is

A. $1/3$

B. $1/5$

C. 1

D. $1/4$

Answer: A

Watch Video Solution

88. If $f(x) = x^3 + 3x + 1$ and $g(x)$ is the inverse function of f(x), then the value of g'(5) is equal to

A. 3

B. $\frac{1}{3}$

C. (1)/(6)`

D. 6

Answer: C

Watch Video Solution

89. The contrapositive of the statement: "If the weather is fine then my friends will come and we go for a picnic".

A. The weather is fine but my friends will not come or we do not go for a picnic.

B. If my friends do not come or we do not go for picnic then weather will not be find.

C. If the weather is not fine then my friends will not come or we do not go for a picnic.

D. The weather is not fine but my friends will come and we go for a picnic.

Answer: B

Watch Video Solution

90. Lines $L_1 \& L_2$ are rotating in an anticlockwise direction about the points $A(-2,)$ and $B(2, 0)$ respectively in such a way that the speed of angle of rotation of line L_2 is double as that of L_1. Initially equations of both lines are y = 0. If the angle of rotation of line L_2 varies between 0 to $\frac{\pi}{2}$, then the locus of point of intersection P of lines $L_1 \& L_2$ is part of a circle whose radius is equal to

A. 2 units

B. 4 units

C. 6 units

D. 8 units

Answer: B

Watch Video Solution

91. The value of the integral $\int e^{3\sin^{-1}x}\left(\frac{1}{\sqrt{1-x^2}}+e^{3\cos^{-1}x}\right)dx$ is equal to

(where, c is an arbitrary constant)

A. $\frac{e^{3\sqrt{\sin^{-1}x}}}{3}+xe^{\frac{3\pi}{2}}+c$

B. $e^{\sqrt{\sin^{-1}x}}+e^{\pi/2}+c$

C. $\frac{e^{3\sin^{-1}x}}{3}+xe^{\frac{3\pi}{2}}+c$

D. $e^{\frac{\pi}{2}}+e^{x}\left(\frac{\pi}{2}\right)+c$

Answer: C

Watch Video Solution

92. If the locus of the foot of the perpendicular drawn from centre upon any tangent to the ellipse $\frac{x^2}{40}+\frac{y^2}{10}=1$ is $\left(x^2+y^2\right)^2=ax^2+by^2$, then $(a-b)$ is equal to

A. 10

B. 20

C. 25

D. 30

Answer: D

Watch Video Solution

93. Let $M = \begin{bmatrix} a & b & c \\ d & e & f \\ 1 & 1 & 1 \end{bmatrix}$ and $N = \frac{M^2}{2}$. If $(a-b)^2 + (d-e)^2 = 36$,

$(b-c)^2 + (e-f)^2 = 64$,

$(a-c)^2 + (d-f)^2 = 100$, then value of $|N|$ is equal to

A. 1152

B. 48

C. 144

D. 288

Answer: D

Watch Video Solution

94. A small pack of cards consists of 5 green cards 4 blue cards and 3 black cards. The pack is shuffled through and first three cards are turned face up. The probability that there is exactly one card of each colour is :

A. $\frac{9}{55}$

B. $\frac{4}{11}$

C. $\frac{3}{11}$

D. $\frac{8}{55}$

Answer: C

Watch Video Solution

95. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors of magntiude 3, 4, 5 respectively, satisfying $\left|\left[\vec{a} \quad \vec{b} \quad \vec{c}\right]\right| = 60.$ If $\left(\vec{a} + 2\vec{b} + 3\vec{c}\right).\left(\left(\vec{a} \times \vec{c}\right) \times \vec{b} + \vec{b}\right) = \lambda$ then λ is equal to

A. 16

B. 32

C. 20

D. 40

Answer: B

Watch Video Solution

96. Let $Z = re^{i\theta}(r > 0 \text{ and } \pi < \theta < 3\pi)$ is a root of the equation $Z^8 - Z^7 + Z^6 - Z^5 + Z^4 - Z^3 + Z^2 - Z + 1 = 0.$

the sum of all values of θ is $k\pi$. Then k is equal to

Watch Video Solution

97. If $I_n = \int_0^{n\pi} \max\left(|\sin x|, \left|\sin^{-1}(\sin x)\right|\right) dx$, the $I_2 + I_4$ has the value $\frac{\lambda\pi^2}{2}$, where λ is

Watch Video Solution

Watch Video Solution

98. If $x \in [0, 2\pi]$ then the number of solution of the equation $81^{\sin^2 x} + 81^{\cos^2 x} = 30$

Watch Video Solution

99. If $f(x) = \begin{cases} \frac{\sin 2x}{cx} + \frac{x}{\left(\sqrt{x+a^2} - a\right)} & x \neq 0, (a < 0) \\ b & x = 0, (b \neq 0) \end{cases}$

and f(x) is continuous at x = 0, then the value of bc is equal to

Watch Video Solution

100. A harbour lies in a direction 60° south - west from a fort and at a distance 30 km from it .A ship sets from the habour at noon and sails due east at 10 km / hour .The ship will be 70 km from the fort at

Watch Video Solution

101. If $u = x^2 + y^2$ and $x = s + 3t, y = 2s - t$, then $\frac{d^2u}{ds^2}$ is equal to

A. 12

B. 32

C. 36

D. 10

Answer: D

Watch Video Solution

102. If N is the number of positive integral solutions of the equation $x_1x_2x_3x_4 = 770$, then the value of N is

A. 250

B. 252

C. 254

D. 256

Answer: D

Watch Video Solution

103. If one root of the equation $x^2 + px + q = 0$ is the square of the other then

A. $p^3 + q^2 - q(3p + 1) = 0$

B. $p^3 + q^2 + q(1 + 3p) = 0$

C. $p^3 + q^2 + q(3p - 1) = 0$

D. $p^3 + q^2 + q(1 - 3p) = 0$

Answer: D

Watch Video Solution

104. If $s_n = \sum_{r=0}^{n} \frac{1}{.^n C_r}$ and $t_n = \sum_{r=0}^{n} \frac{r}{.^n C_r}$, then $\frac{t_n}{s_n}$ is equal to

A. $n - 1$

B. $\frac{1}{2}n - 1$

C. $\frac{1}{2}n$

D. $\frac{2n-1}{2}$

Answer: C

Watch Video Solution

105. $\lim_{x \to 0} \frac{1 + \sin x - \cos x + \ln(1 - x)}{x \cdot \tan^2 x}$

A. $-\frac{1}{2}$

B. $-\frac{1}{3}$

C. $\frac{1}{2}$

D. $\frac{1}{4}$

Answer: A

Watch Video Solution

106. The range of value of α such that $(0, \alpha)$ lies on or inside the triangle formed by the lines y + 3x + 2 = 0, 3y - 2x - 5 = 0, 4y + x - 14 =0 is

A. $0 < \upsilon\eta < \frac{5}{2}$

B. $0 < \beta < \frac{7}{2}$

C. $\frac{5}{3} \leq \beta \leq \frac{7}{2}$

D. None of these

Answer: C

Watch Video Solution

107. The value of $\int_0^{\pi} \left(\Sigma_{r=0}^{3} a_r \cos^{3-r} x \sin^r x\right) dx$ depends upon

A. a_1 and a_2

B. a_0 and a_3

C. a_2 and a_3

D. a_1 and a_3

Answer: D

Watch Video Solution

108. Solve the equation: $\tan^{-1}\sqrt{x^2+x}+\sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$

A. $-1, 0$

B. $0, 1$

C. $-1, 1$

D. $-1, 2$

Answer: A

Watch Video Solution

109. The sum of $0.2 + 0.22 + 0.222 + \dots$ to n terms is equal to

A. $\left(\frac{2}{9}\right) - \left(\frac{2}{81}\right)(1 - 10^{-n})$

B. $n\left(\frac{1}{9}\right)(1 - 10^{-n})$

C. $\left(\frac{2}{9}\right)\left[n - \left(\frac{1}{9}\right)(1 - 10^{-n})\right]$

D. $\left(\frac{2}{9}\right)$

Answer: C

Watch Video Solution

110. If tangent at (1, 2) to the circle $C_1 : x^2 + y^2 = 5$ intersects the circle $C_2 : x^2 + y^2 = 9$ at A and B and tangents at A and B to the second circle meet at point C, then the co- ordinates of C are given by

A. $(4, -5)$

B. $\left(\frac{3}{5}, \frac{6}{5}\right)$

C. $(4, 5)$

D. $\left(\frac{9}{5}, \frac{18}{5}\right)$

Answer: D

Watch Video Solution

111. The minimum distance of a point on the curve $y = x^2 - 4$ from origin

,

A. $\frac{\sqrt{15}}{2}$ units

B. $\sqrt{\frac{19}{2}}$ units

C. $\sqrt{\frac{15}{2}}$ units

D. $\frac{\sqrt{19}}{2}$ units

Answer: A

Watch Video Solution

112. The domain of the function $f(x) = \sqrt{\ln_{(|x|-1)}(x^2+4x+4)}$ is

A. $[-3, -1] \cup [1, 2]$

B. $(-2, -1) \cup [2, \infty)$

C. $(-\infty, -3] \cup (-2. -1) \cup (2, \infty)$

D. $[-2, -1] \cup [2, \infty)$

Answer: C

Watch Video Solution

113. The expression $(1+\tan x+\tan^2 x)(1-\cot x+\cot^2 x)$ has the positive values for x, given by

A. $\left[0, \frac{\pi}{2}\right]$

B. $[0, \pi]$

C. $R - \left\{x = \frac{n\pi}{2}, n \in I\right\}$

D. $[0, \infty]$

Answer: C

Watch Video Solution

114. the value of θ for which the system of equations $(\sin 3\theta)x - 2y + 3z = 0, (\cos 2\theta)x + 8y - 7z = 0$ and $2x + 14y - 11z = 0$ has a non - trivial solution, is (here, $n \in Z$)

A. $n\pi$

B. $n\pi + (-1)^n \pi/3$

C. $n\pi + (-1)^n \pi/2$

D. None of these

Answer: A

Watch Video Solution

115. If both the mean and the standard deviation of 50 observatios $x_1, x_2, \dots . x_{50}$ are equal to 16, then the mean of $(x_1 - 4)^2, (x_2 - 4)^2, \dots . , (x_{50} - 4)^2$ is

A. 525

B. 480

C. 400

D. 380

Answer: C

Watch Video Solution

116. For an initial screening of an admission test, a candidate is given fifty problems to solve. If the probability that the candidate can solve any proglem is $\frac{4}{5}$, then the probability that he is unable to solve less than two problem is

A. $\frac{201}{5}\left(\frac{1}{5}\right)^{49}$

B. $\frac{164}{25}\left(\frac{1}{5}\right)^{48}$

C. $\frac{316}{25}\left(\frac{4}{5}\right)^{48}$

D. $\frac{54}{5}\left(\frac{4}{5}\right)^{49}$

Answer: D

Watch Video Solution

117. Let S be the set of all real numbers. Then the relation $R = \{(a, b) : 1 + ab > 0\}$ on S is

A. reflexive and symmetric but not transitive

B. reflexive and transitive but not symmetric

C. reflexive, transitive and symmetric

D. None of the above

Answer: A

Watch Video Solution

118. The contrapositive of $(p \vee q) \to r$ is

A. $r \Rightarrow (p \vee q)$

B. ~$r \Rightarrow (p \vee q)$

C. ~$r \Rightarrow$ ~$p \wedge$ ~q

D. $r \Rightarrow (q \vee r)$

Answer: C

Watch Video Solution

119. $\left(1+\cos.\frac{\pi}{8}\right)\left(1+\cos.\frac{3\pi}{8}\right)\left(1+\cos.\frac{5\pi}{8}\right)\left(1+\cos.\frac{7\pi}{8}\right)$ is equal to

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{1}{8}$

D. $\frac{1}{16}$

Answer: C

Watch Video Solution

120. The area of the closed region bounded by $y = \sec^{-1} x, y = \text{cosec}^{-1} x$ and the line $x - 1 = 0$ is

A. $\left\{\log_e \left(3 + 2\sqrt{2}\right) - \frac{\pi}{2}\right\}$ sq. units

B. $\left\{\frac{\pi}{2} - \log_e \left(3 + 2\sqrt{2}\right)\right\}$ sq. units

C. $\pi - 3 \log_e 3$ sq. units

D. None of these

Answer: A

Watch Video Solution

121. Tangents are drawn from the point $(\alpha, 2)$ to the hyperbola $3x^2 - 2y^2 = 6$ and are inclined at angles θ and ϕ to the x-axis . If $\tan\theta, \tan\phi = 2,$ then the value of $2\alpha^2 - 7$ is

Watch Video Solution

122. Let $f: R \to R$ be a differentiable function with $f(0) = 1$ and satisfying the equation $f(x+y) = f(x)f'(y) + f'(x)f(y)$ for all $x, \ y \in R$. Then, the value of $(\log)_e(f(4))$ is ______

Watch Video Solution

123. Let $\vec{a}, \vec{b}, \vec{c}$ be three non-zero non coplanar vectors and $\vec{p}, \vec{q}$ and $\vec{r}$ be three vectors given by $\vec{p} = \vec{a} + \vec{b} - 2\vec{c}, \vec{q} = 3\vec{a} - 2\vec{b} + \vec{c}$ and $\vec{r} = \vec{a} - 4vcb + 2\vec{c}$

If the volume of the parallelopiped determined by $\vec{a}, \vec{b}$ and $\vec{c}$ is V_1 and that of the parallelopiped determined by $\vec{a}, \vec{q}$ and $\vec{r}$ is V_2, then $V_2 : V_1 =$

Watch Video Solution

124. If a complex number z lie on a circle of radius $\frac{1}{2}$ units, then the complex number $\omega = -1 + 4z$ will always lie on a circle of radius k units, where k is equal to

Watch Video Solution

125. $\int [\sin(101x) \cdot \sin^{99} x] dx$

Watch Video Solution

Math

1. The solution of dy = cos x $(2 - y \text{ cosec } x)dx$, where $y = \sqrt{2}$, when $x = \pi/4$ is

A. $y = \sin x + \frac{1}{2} \cos ecx$

B. $y = \tan(x/2) + \cot(x/2)$

C. $y = (1/\sqrt{2})\sec(x/2) + \sqrt{2}\cos(x/2)$

D. None of the above

Answer: A

Watch Video Solution

2. Find the domain of the function f given by $f(x) = \dfrac{1}{\sqrt{[x]^2 - [x] - 6}}$

A. $(-\infty, -2)$

B. $(-\infty, -2) \cup [4, \infty)$

C. $[4, \infty)$

D. $(-\infty, -2] \cup [4, \infty)$

Answer: B

Watch Video Solution

3. The area of the region (in square units) above the x - axis bounded by the curve $y = \tan x, 0 \leq x \leq \frac{\pi}{2}$ and the tangent to the curve at $x = \frac{\pi}{4}$ is

A. $\frac{1}{2}\left(\log 2 - \frac{1}{2}\right)$

B. $\frac{1}{2}(1 + \log 2)$

C. $\frac{1}{2}(1 - \log 2)$

D. $\frac{1}{2}\left(\log 2 + \frac{1}{2}\right)$

Answer: A

Watch Video Solution

4. Two men are on the opposite sides of a tower. They measure the angles of elevation of the top of the tower as 45° and 30° respectively. If the height of the tower is 40 m, then the distance between the men is

A. 40 m

B. $40\sqrt{3}m$

C. 68.28 m

D. 109.28 m

Answer: D

Watch Video Solution

5. Let $C_1, C_2, C_3...$ are the usual binomial coefficients where $C_r = .^n C_r$.

Let $S = C_1 + 2C_2 + 3C_3 + \ldots + nC_n$, then S is equal to

A. $n2^n$

B. 2^{n-1}

C. $n2^{n-1}$

D. 2^{n+1}

Answer: C

Watch Video Solution

6. If $p = \sin^2 x + \cos^4 x$, then

A. $\frac{3}{4} \leq p \leq 1$

B. $\frac{3}{16} \leq p \leq \frac{1}{4}$

C. $\frac{1}{4} \leq p \leq \frac{1}{2}$

D. None of these

Answer: A

Watch Video Solution

7. If $p \Rightarrow (q \vee r)$ is false, then the truth values of p, q, r are respectively

A. T, F, F

B. F, T, T

C. F, F, F

D. T, T, F

Answer: A

Watch Video Solution

8. A box contains tickets numbered 1 to N. n tickets are drawn from the box with replacement. The probability that the largest number on the tickets is k, is

A. $\left(\frac{k}{N}\right)^n$

B. $\left(\frac{k-1}{N}\right)^n$

C. 0

D. None of these

Answer: D

Watch Video Solution

9. The coordinates of the focus of the parabola described parametrically by $x = 5t^2 + 2. y = 10t + 4$ are

A. $(7, 4)$

B. $(3, 4)$

C. $(3, -4)$

D. $(-7, 4)$

Answer: A

Watch Video Solution

10. The rate of change of $\sqrt{x^2 + 16}$ with respect to $\frac{x}{x-1}$ at $x = 3$ is

A. 2

B. $\frac{11}{5}$

C. $-\frac{12}{5}$

D. -3

Answer: C

Watch Video Solution

11. If $\left|\frac{z-i}{z+2i}\right|=1, |z|=\frac{5}{2}$ then the value of $|z+3i|$

A. $\sqrt{10}$

B. $\frac{7}{2}$

C. $\frac{15}{4}$

D. $2\sqrt{3}$

Answer: B

Watch Video Solution

12. Let a,b,c are respectively the sums of the first n terms, the next n terms and the next n terms of a GP. Show that a,b,c are in GP.

A. arithmetic progression

B. geometric progression

C. harmonic progression

D. none of these

Answer: B

Watch Video Solution

13. The function $f(x) = \{x\}\sin(\pi[x])$, where [.] denotes the greatest integer function and {.} is the fractional part function, is discontinuous at

A. all x

B. all integer points

C. no x

D. x which is not an integer

Answer: C

Watch Video Solution

14. There are number of seats and m number of people have to be seated, then how many ways are possible to do this $(m < n)$?

A. $.^{n}P_{m}$

B. $.^{n}C_{m}$

C. $.^{n}C_{n} \times (m-1)!$

D. $.^{n-1}P_{m-1}$

Answer: A

Watch Video Solution

15. Let $I = \int_0^1 \frac{\sin}{\sqrt{x}} dx \text{and} J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$ Then which one of the following is true?

A. $I > \frac{2}{3}$ and $J < 2$

B. $I > \frac{2}{3}$ and $J > 2$

C. $I < \frac{2}{3}$ and $J < 2$

D. $I > \frac{2}{3}$ and $J > 2$

Answer: C

Watch Video Solution

16. If $\begin{vmatrix} a^2 & b^2 & c^2 \\ (a+\lambda)^2 & (b+\lambda)^2 & (c+\lambda)^2 \\ (a-\lambda)^2 & (b-\lambda)^2 & (c-\lambda)^2 \end{vmatrix} = k\lambda \begin{vmatrix} a^2 & b^2 & c^2 \\ a & b & c \\ 1 & 1 & 1 \end{vmatrix} \lambda \neq 0$ then k is equal to :

A. $4\lambda abc$

B. $-4\lambda^2$

C. $4\lambda^2$

D. $-4\lambda abc$

Answer: C

Watch Video Solution

17. Coefficent of variation of two distributions are 60% and 75%, and their standard deviations are 18 and 15 respectively. Find their arithmetic means.

A. 30, 30

B. 30, 20

C. 20, 30

D. 20, 20

Answer: B

Watch Video Solution

18. $\{x \in R: \cos 2x + 2\cos^2 x = 2\}$ is equal to

A. $\left\{2n\pi + \frac{\pi}{3}: n \in Z\right\}$

B. $\left\{n\pi \pm \frac{\pi}{6} : n \in Z\right\}$

C. $\left\{n\pi + \frac{\pi}{3} : n \in Z\right\}$

D. $\left\{2n\pi - \frac{\pi}{3} : n \in Z\right\}$

Answer: B

Watch Video Solution

19. $\lim_{x \to 0} \frac{\ln(1+x)}{x^2} + \frac{x-1}{x} =$

A. ∞

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. 1

Answer: B

Watch Video Solution

20. The abscissa of the points, where the tangent to curve $y = x^3 - 3x^2 - 9x + 5$ is parallel to X-axis are

A. x = 0

B. x = 1 and -1

C. x = 1 and -3

D. $x = -1$ and 3

Answer: D

Watch Video Solution

21. The value of $x, \forall x \in R$ which satisfy the equation $(x-1)\left|x^2 - 4x + 3\right| + 2x^2 + 3x - 5 = 0$ is

Watch Video Solution

22. Let $f(x)=\frac{9x}{25}+c, c>0$. If the curve $y=f^{-1}(x)$ passes through $\left(\frac{1}{4}, -\frac{5}{4}\right)$ and g(x) is the antiderivative of $f^{-1}(x)$ such that $g(0)=\frac{5}{2}$, then the value of $[g(1)]$ is, (where [.] represents the greatest integer function)

Watch Video Solution

23. Let $x+\frac{1}{x}=2, y+\frac{1}{y}=-2$ and $\sin^{-1}x+\cos^{-1}y=m\pi$, then the value of m is

Watch Video Solution

24. If $\hat{i}\times\left[\left(\vec{a}-\hat{j}\right)\times\hat{i}\right]+\hat{j}\times\left[\left(\vec{a}-\hat{k}\right)\times\hat{j}\right]+\hat{k}\times\left[\left(\vec{a}-\hat{i}\right)\times\hat{k}\right]=0$ and $\vec{a}=x\hat{i}+y\hat{j}+z\hat{k}$, then find the value of $8\left(x^3-xy+zx\right)$

Watch Video Solution

25. A circle touches the hypotenuse of a right angled triangle at its middle point and passes through the middle point of shorter side. If 3 unit and 4 unit be the length of the sides and 'r be the radius of the circle, then find the value of3r

Watch Video Solution

26. if $\sum_{r=0}^{25} .^{50} C_r \left(.^{50-r} C_{25-r}\right) = k\left(.^{50} C_{25}\right)$, then k equals:

A. 2^{25}

B. $2^{25} - 1$

C. 2^{24}

D. $(25)^2$

Answer: A

Watch Video Solution

27. If $1, \log_3 \sqrt{3^{1-x} + 2}, \log_3(4 \cdot 3^x - 1)$ are in AP then x equals

A. $\log_3 4$

B. $1 - \log_3 4$

C. $1 - \log_4 3$

D. $\log_4 3$

Answer: B

Watch Video Solution

28. The area (in square units) enclosed by $|y| - x^2 = 1$ and $x^2 + y^2 = 1$ is

A. 2

B. zero

C. infinite

D. None of these

Answer: B

Watch Video Solution

29. A computer producing factory has only two plants T_1 and T_2. Plant T_1 produces 20% and plant T_2 produces 80% of the total computers produced. 7% of computers produced in the factory turn out to be defective. It is known that P(computer turns out to bedefective, given that it is produced in plant T_1)=10P (computer turns out to be defective, given that it is produced in plant T_2), where P(E) denotes the probability of an event E.A computer produced in the factory is randomly selected and it does not turn out to be defective. Then, the probability that it is produced in plant T_2, is

A. $\frac{36}{73}$

B. $\frac{47}{79}$

C. $\frac{78}{93}$

D. $\frac{75}{83}$

Answer: C

Watch Video Solution

30. Set of values of b for which local extrema of the function f(x) are positive where $f(x) = \frac{2}{3}a^2x^3 - \frac{5a}{2}x^2 + 3x + b$ and maximum occurs at $x = \frac{1}{3}$ is -

A. $-(4, \infty)$

B. $\left(-\frac{3}{8}, \infty\right)$

C. $\left(-10, \frac{3}{8}\right)$

D. None of these

Answer: B

Watch Video Solution

31. If p and q are two statements, then $p \vee \sim(p \Rightarrow \sim q)$ is equivalent to

A. $p \wedge q$

B. P

C. q

D. $\sim p \wedge q$

Answer: B

Watch Video Solution

32. The coordinates of the orthocenter of the triangle that has the coordinates of midpoint of its sides as (0,0) , (1,2) and (- 6,3) is

A. (0,0)

B. (- 4,5)

C. (-5,5)

D. (-4,4)

Answer: C

Watch Video Solution

33. On differentiating $\tan^{-1}\left[\frac{\sqrt{1+x^2}-1}{x}\right]$ with respect to x, the result would be

A. $\frac{1}{2}\cdot\frac{1}{1+x^2}$

B. $\frac{1}{1+x^2}$

C. $\frac{2}{1+x^2}$

D. $\frac{1}{2}\cdot\frac{1}{1+2x}$

Answer: A

Watch Video Solution

34. Sum of the squares of all integral values of a for which the inequality $x^2+ax+a^2+6a<0$ is satisfied for all $x\in(1,2)$ must be equal to

A. 90

B. 89

C. 88

D. 91

Answer: D

Watch Video Solution

35. If $f:(0,\infty)\to(0,\infty)$ and $f(x)=\frac{x}{1+x}$, then f is

A. one-one and onto

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer: B

Watch Video Solution

36. The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and standard deviation?

A. 4

B. 6

C. 3

D. 5

Answer: D

Watch Video Solution

37. $\sum_{k=1}^{10}\left(\frac{\sin(2k\pi)}{11}+i\frac{\cos(2k\pi)}{11}\right)$

A. 1

B. -1

C. i

D. $-i$

Answer: C

Watch Video Solution

38. The value of $\lim_{n \to \infty} \sum_{r=1}^{r=4n} \frac{\sqrt{n}}{\sqrt{r}\left(3\sqrt{r}+4\right)\sqrt{n}^2}$ is equal to

A. $\frac{1}{8}$

B. $\frac{1}{10}$

C. $\frac{1}{6}$

D. $\frac{1}{9}$

Answer: B

Watch Video Solution

39. The angle of elevation of a cloud from a point 250 m above a lake is 15° and angle of depression of its reflection in lake is 45°. The height of the cloud is

A. $250\sqrt{3}m$

B. 250 m

C. $\frac{250}{\sqrt{3}}m$

D. None of these

Answer: A

Watch Video Solution

40. Let P be the relation defined on the set of all real number such that $P = \left[(a, b) : \sec^2 a - \tan^2 b = 1\right]$. Then P is:

A. reflexive and symmetric but not transitive

B. symmetric and transitive but not reflexive

C. reflexive and transitive but not symmetric

D. an equivalence relation

Answer: D

Watch Video Solution

41. The general solution of the differential equation $\left[2\sqrt{xy}-x\right]dy+ydx=0$ is (Here x,$y>0$)

A. $\log x+\sqrt{\frac{y}{x}}=c$

B. $\log y-\sqrt{\frac{x}{y}}=c$

C. $\log y+\sqrt{\frac{x}{y}}=c$

D. None of these

Answer: C

Watch Video Solution

42. Let $f:(-1,1)\rightarrow R$ be a function defind by f(x) =max. $\left\{-|x|, -\sqrt{1-x^2}\right\}$. If K is the set of all points at which f is not differentiable, then K has set of all points at which f is not differentible, then K has exactly

A. two elements

B. one element

C. three elements

D. five elements

Answer: C

Watch Video Solution

43. The value of $2\sin^2\theta+4\cos(\theta+\alpha)\sin\alpha\sin\theta+\cos2(\alpha+\theta)$

A. $\cos\theta+\cos\alpha$

B. independent of θ

C. independent of α

D. independent of both θ and α

Answer: B

Watch Video Solution

44. If A = $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$, B = adj A and C = 3A then $\frac{|adjB|}{|C|}$ is equal to

A. 8

B. 16

C. 72

D. 2

Answer: A

Watch Video Solution

45. $\lim_{x \to \frac{\pi}{2}} \frac{\left[1 - \tan\left(\frac{x}{2}\right)\right][1 - \sin x]}{\left[1 + \tan\left(\frac{x}{2}\right)\right][\pi - 2x]^3}$

A. $\frac{1}{8}$

B. 0

C. $\frac{1}{32}$

D. ∞

Answer: C

Watch Video Solution

46. From the string abacabababcdced, if 5 letters should be selected , then the number of ways in which this selection can be done is

A. 51

B. 91

C. 71

D. 42

Answer: C

Watch Video Solution

47. Let $\vec{a}$ and $\vec{b}$ be two unit vectors such that $\vec{a}.\vec{b}=0$ For some $x, y \in R$, let $\vec{c}=x\vec{a}+y\vec{b}+\left(\vec{a}\times\vec{b}\right)$ If $\left|\vec{c}\right|=2$ and the vector $\vec{c}$ is inclined at same angle α to both $\vec{a}$ and $\vec{b}$ then the value of $8\cos^2\alpha$ is

Watch Video Solution

48. Number of solution of $2^{\sin(|x|)}=3^{|\cos x|}$ in $[-\pi, \pi]$, is equal to

Watch Video Solution

49. The point, which is at the shortest distance from the line $x + y = 7$ and lying on an ellipse $x^2 + 2y^2 = 6$, has coordinates (a, b) then the value of $\frac{a}{b}$ is

A.

B.

C.

D.

Answer: 2

Watch Video Solution

50. If

$$y = \tan^{-1}\left(\frac{1}{x^2 + x + 1}\right) + \tan^{-1}\left(\frac{1}{x^2 + 3x + 3}\right) + \tan^{-1}\left(\frac{1}{x^2 + 5x +$$

and $\left(\frac{dy}{dx}\right)_{x=0} = \frac{-k}{1+k}$ then the value of k is

Watch Video Solution

Mathemetic Single Choice

1. $f(x) = \max\left\{\frac{x}{n}, |\sin \pi x|\right\}, n \in N.$ has maximum points of non-differentiability for $x \in (0, 4)$, Then n cannot be (A) 4 (B) 2 (C) 5 (D) 6

Watch Video Solution

2. The value of the expression $\frac{2(\sin 1^\circ + \sin 2^\circ + \sin 3^\circ + \ldots\ldots. + \sin 89^\circ)}{2(\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \ldots\ldots. + \cos 44^\circ) + 1}$ is equal to

A. $\sqrt{2}$

B. $\frac{1}{\sqrt{2}}$

C. $\frac{1}{2}$

D. 0

Answer: A

Watch Video Solution

3. The sum of all real values of x satisfying the equation $\left(x^2 - 5x + 5\right)^{x^2 + 4x - 60} = 1$ is:

A. 6

B. 5

C. 3

D. -4

Answer: C

Watch Video Solution

4. If $C_0, C_1, C_2, \ldots.., C_n$ are binomial coefficients, (where $C_r = .^n C_r$), then the value of $C_0 - C_1 + C_2 - C_3 + \ldots. + (-1)^n C_n$ is equal to

A. 2^{n-1}

B. 2^n

C. 0

D. 1

Answer: C

Watch Video Solution

5. If $f(x) = \cos x \cos 2x \cos 4x \cos(8x). \cos 16x$ then find $f'\left(\frac{\pi}{4}\right)$

A. $\sqrt{2}$

B. $\frac{1}{\sqrt{2}}$

C. 1

D. none of these

Answer: A

Watch Video Solution

6. $(p \to q) \wedge (q \to \ - p)$ is equivalent to

A. p

B. q

C. ~p

D. ~q

Answer: C

Watch Video Solution

7. z is a complex number such that $|Re(z)| + |Im(z)| = 4$ then $|z|$ can't be

A. $\sqrt{\frac{17}{2}}$

B. $\sqrt{10}$

C. $\sqrt{7}$

D. $\sqrt{8}$

Answer: C

Watch Video Solution

8. $\int \frac{\ln\left(\frac{x-1}{x+1}\right)}{x^2-1}dx$ is equal to

A. $\frac{1}{2}\left(\ln\left(\frac{x-1}{x+1}\right)\right)^2+C$

B. $\frac{1}{2}\left(\ln\left(\frac{x+1}{x-1}\right)\right)^2+C$

C. $\frac{1}{4}\left(\ln\left(\frac{x-1}{x+1}\right)\right)^2+C$

D. $\frac{1}{4}\left(\ln\left(\frac{x+1}{x-1}\right)\right)^2+C$

Answer: C

Watch Video Solution

9. A circle of radius 2 units is touching both the axes and a circle with centre at (6,5). The distance between their centres is

A. 8 units

B. 5 units

C. 7 units

D. none of these

Answer: B

Watch Video Solution

10. The value of the expression $\cot^{-1}\left(\frac{1}{2}\right)+\cot^{-1}\left(\frac{9}{2}\right)+\cot^{-1}\left(\frac{25}{2}\right)+\cot^{-1}\left(\frac{49}{2}\right)$ upto + ...n terms is

A. $\tan^{-1} 2n$

B. $\tan^{-1}(2n-1)$

C. $\tan^{-1} n$

D. $\tan^{-1} 2n - \tan^{-1} 1$

Answer: A

Watch Video Solution

11. If $\begin{vmatrix} x-4 & 2x & 2x \\ 2x & x-4 & 2x \\ 2x & 2x & x-4 \end{vmatrix} = (A+Bx)(x-A)^2$ then the ordered pair (A,B) is equal to

A. $(4, 5)$

B. $(-4, -5)$

C. $(-4, 3)$

D. $(-4, 5)$

Answer: D

Watch Video Solution

12. A rectangle with sides of lengths $(2n-1)$ and $(2m-1)$ units is divided into squares of unit length. The number of rectangles which can be formed with sides of odd length, is

A. m^2n^2

B. $mn(m+1)(n+1)$

C. $4(m+n)-1$

D. none of these

Answer: A

Watch Video Solution

13. For a group of 50 male workers, the mean and the standard deviation of their daily wages are Rs. 630 and Rs. 90 respectively and for a group of 40 female workers these are Rs. 540, and Rs . 60 respectively. Then, the standard deviation of all these 90 workers is

A. 60

B. 70

C. 80

D. 90

Answer: D

Watch Video Solution

14. If $\lim_{x \to 0} \frac{\{(a-n)nx - \tan x\}\sin nx}{x^2} = 0$, where n is non-zero real number, then a is equal to

A. 0

B. $\frac{n+1}{n}$

C. n

D. $n + \frac{1}{n}$

Answer: D

Watch Video Solution

15. Find the point at which the slope of the tangent of the function $f(x) = e^x \cos x$ attains minima, when $x \in [0, 2\pi]$.

A. $x = \pi$

B. $x = \frac{\pi}{4}$

C. $x = \frac{3\pi}{4}$

D. $x = \frac{3\pi}{2}$

Answer: A

Watch Video Solution

16. There are 5 machines. Probability of a machine being faulted is $\frac{1}{4}$. Probability of atmost two machines is faulted, is $\left(\frac{3}{4}\right)^3 k$, then value of k is

A. $\frac{17}{8}$

B. $\frac{17}{4}$

C. $\frac{17}{2}$

D. 4

Answer: A

Watch Video Solution

17. The point of intersection of the lines

$\vec{r} = 7\hat{i} + 10\hat{j} + 13\hat{k} + \vec{s}\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$ and

$\vec{r} = 3\hat{i} + 5\hat{j} + 7\hat{k} + t\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$ is

A. $\hat{i} + \hat{j} - \hat{k}$

B. $2\hat{i} - \hat{j} + 4\hat{k}$

C. $\hat{i} - \hat{j} + \hat{k}$

D. $\hat{i} + \hat{j} + \hat{k}$

Answer: D

Watch Video Solution

18. The solution of the differential equation

$\frac{dy}{dx} + x(2x+y) = x^3(2x+y)^3 - 2$ is (C being an arbitrary constant)

A. $\frac{1}{2x+xy} = x^2 + 1 + Ce^x$

B. $\frac{1}{(2x+y)^2} = x^2 + 1 + Ce^{x^2}$

C. $\frac{1}{2x+y} = x^2 + 1 + Ce^{-x^2}$

D. $\frac{1}{(2x+y)^2} = x^2 + 1 + Ce$

Answer: B

Watch Video Solution

19. If $\vec{a}, \vec{b}, \vec{c}$ are mutually perpendicular vectors having magnitudes 1,2,3 respectively, then $\left[\vec{a}+\vec{b}+\vec{c} \quad \vec{b}-\vec{a} \quad \vec{c}\right] =$

A. 0

B. 6

C. 12

D. 18

Answer: C

Watch Video Solution

20. The length of the chord of the parabola $x^2 = 4y$ having equations $x - \sqrt{2}y + 4\sqrt{2} = 0$ is

A. $6\sqrt{3}$ units

B. $8\sqrt{2}$ units

C. $2\sqrt{11}$ units

D. $3\sqrt{2}$ units

Answer: A

Watch Video Solution

Mathemetic Subjective Numerical

1. The area bounded by the curves y=lnx, y=ln|x|, y=|lnx| and y=|ln||x| is

Watch Video Solution

2. The number of elements in the set $\{(a, b): a^2 + b^2 = 50, a, b \in Z\}$ where Z is the set of all integers, is

Watch Video Solution

3. The value of the integral $\int_0^{\frac{1}{2}} \frac{1+\sqrt{3}}{\left((x+1)^2(1-x)^6\right)^{\frac{1}{4}}} dx$ is ______.

Watch Video Solution

4. If $\sum_{k=1}^{\infty} \frac{1}{(k+2)\sqrt{k} + k\sqrt{k+2}} = \frac{\sqrt{a} + \sqrt{b}}{\sqrt{c}}$, where $a, b, c \in N$ and $a, b, c \in [1, 15]$, then a + b + c is equal to

Watch Video Solution

5. Consider the equation

$\log_{\sqrt{2}\sin x}(1+\cos x)=2,\ x\in\left[-\frac{\pi}{2},\frac{3\pi}{2}\right]$.If the sum of the roots is $\frac{p\pi}{q}$, where G.C.D (p,q) = 1 then the value of $p^2+q^2$is

Watch Video Solution

Mcqs Math

1. If x, y and z are in AP and $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are also in AP, then

A. x=y=z

B. x=y=-z

C. x=1,y=2,z=3

D. x=2,y=4,z=6

Answer: A

Watch Video Solution

2. If $\vec{r} \cdot \hat{i} = 2\vec{r} \cdot \hat{j} = 4\hat{r} \cdot \hat{k}$ and $\left|\vec{r}\right| = \sqrt{84}$, then the value of $\vec{r} \cdot \left(2\hat{i} - 3\hat{j} + \hat{k}\right)$ may be

Watch Video Solution

3. If $A = \{x \in R : |x| < 2\}$ and $B = \{x \in R : |x - 2| \geq 3\}$, then

A. $A \cap B = (-2, -1)$

B. $B - A = R - (-2, 5)$

C. $A \cup B = R - (2, 5)$

D. $A - B = [-1, 2)$

Answer: B

Watch Video Solution

4. On which of the following intervals is the function $x^{100} + \sin x - 1$ decreasing?

A. $\left(0, \frac{\pi}{2}\right)$

B. $(0, 1)$

C. $\left(\frac{\pi}{2}, \pi\right)$

D. none of these

Answer: D

Watch Video Solution

5. The area bounded by the graph y=[x-3], the X-axis and the lines x=-2 and x=3 is ([.] denotes the greatest integer function)

A. 7 sq. units

B. 15 sq. units

C. 21 sq. units

D. 28 sq. units

Answer: B

Watch Video Solution

6. $\lim_{n \to \infty} \frac{3.2^{n+1} - 4.5^{n+1}}{5.2^n + 7.5^n} =$

A. $\frac{3}{5}$

B. $-\frac{4}{7}$

C. $-\frac{20}{7}$

D. 0

Answer: C

Watch Video Solution

7. Let function F be defined as $f(x) = \int_1^x \frac{e^t}{t} dtx > 0$ then the vaiue of the integral $\int_1^1 \frac{e^t}{t+a} dt$ where $a > 0$ is

A. $e^a[F(x) - F(1+a)]$

B. $e^{-a}[F(x+a) - F(a)]$

C. $e^a[F(x+a) - F(1+a)]$

D. $e^{-a}[F(x+a) - F(1+a)]$

Answer: D

Watch Video Solution

8. The sum of the squares of deviation of 10 observations from their mean 50 is 250,then coefficient of variation is

A. 25

B. 50

C. 10

D. 5

Answer: C

Watch Video Solution

9. 2.The number of ordered pair(s) (x,y) satisfying y = 2 sinx and $y = 5x^2 + 2x + 3$ is equal to-

A. 0

B. 1

C. 2

D. infinite

Answer: A

Watch Video Solution

10. If $g(x) = x^2 + x + x - 1$ and $g(f(x)) = 4x^2 - 10x + 5$ then find $f\left(\frac{5}{4}\right)$

A. $\frac{3}{2}$

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. $-\frac{3}{2}$

Answer: B

Watch Video Solution

11. The tangents to $x^2 + y^2 = a^2$ having inclinations α and β intersect at P. If $\cot\alpha\cot\beta = 0$, then find the locus of P.

A. $x + y = 0$

B. $x - y = 0$

C. $xy = 0$

D. none of these

Answer: C

Watch Video Solution

12. Which of the following is logically equivalent to $\sim(\sim p \rightarrow q)$?

A. $p \wedge q$

B. $q \wedge \sim q$

C. $\sim p \wedge q$

D. $\sim p \wedge \sim q$

Answer: D

Watch Video Solution

13. The number of different terms in the expansion of $(1-x)^{201}(1+x+x^2)^{200}$ is

A. 200

B. 201

C. 202

D. 402

Answer: D

Watch Video Solution

14. The angle of elevation of an object on a hill is observed from a certain point in the horizontal plane through its base, to be 30°. After walking 120 m towards it on a level groud, the angle of elevation is found to be 60°. Then the height of the object (in metres) is

A. 120

B. $60\sqrt{3}$

C. $120\sqrt{3}$

D. 60

Answer: B

Watch Video Solution

15. If α, β are the roots of the equation $x^2 - 3x + 4 = 0$, then the equation whose roots are $\frac{\alpha - 2}{\alpha + 2}, \frac{\beta - 2}{\beta + 2}$ is

A. $7x^2 - 1 = 0$

B. $7x^2 + 1 = 0$

C. $7x^2 + 2 = 0$

D. $7x^2 - 2 = 0$

Answer: B

Watch Video Solution

16. If $y = A\cos(\log x) + B\sin(\log x)$ then prove that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0.$

A. y

B. $-y$

C. 2y

D. $-2y$

Answer: B

Watch Video Solution

17. If z be a complex number satisfying $|z - 4 + 8i| = 4$, then the least and the greatest value of $|z + 2|$ are respectively (where $i = \sqrt{-i}$)

A. 7 and 16

B. 8 and 17

C. 6 and 14

D. 5 and 13

Answer: C

Watch Video Solution

18. A perpendicular is drawn from a point on the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z}{1}$ to the plane $x+y+z=3$ such that plane $x-y+z=3$. Then, the coordinates of Q are

A. (2,0,1)

B. (-1,0,4)

C. (4,0,-1)

D. (1,0,2)

Answer: A

Watch Video Solution

19. The general solution of the differential equation $\frac{dy}{dx} + \frac{\sin(x+y)}{2} = \frac{\sin(x-y)}{2}$ is

A. ln tan $\left(\frac{y}{2}\right) = c - 2\sin x$

B. ln tan $\left(\frac{y}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

C. ln tan $\left(\frac{y}{2} + \frac{\pi}{4}\right) = c -$ 2sin x

D. ln tan $\left(\frac{y}{4} + \frac{\pi}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

Answer: B

Watch Video Solution

20. The number of value of $x \in [0, 2]$ at which $f(x) = \left|x - \frac{1}{2}\right| + |x - 1| + \tan x$ is not differentiable at

Watch Video Solution

21. Find the number of ways in which four distinct balls can be kept into two identical boxes so that no box remains empty.

Watch Video Solution

22. A bag contains b blue balls and r red balls. If two balls are drawn at random, the probability drawing two red balls is five times the probability of drawing two blue balls. Furthermore, the probability of drawing one ball of each color is six times the probability of drawing two blue balls. Then

Watch Video Solution

23. If the maximum and minimum values of the determinant

$$\begin{vmatrix} 1+\sin^2 x & \cos^2 x & \sin 2x \\ \sin^2 x & 1+\cos^2 x & \sin 2x \\ \sin^2 x & \cos^2 x & 1+\sin 2x \end{vmatrix}$$

are α and β respectively, then $\alpha + 2\beta$ is equal to

Watch Video Solution

24. The equation of the common tangent to the curves $y^2 = 4x$ and $x^2 + 32y = 0$ is $x + by + c = 0$. the value of $\left|\sin^{-1}(\sin 1) + \sin^{-1}(\sin b) + \sin^{-1}(\sin c)\right|$ is equal to

Watch Video Solution

25. $I = \int \frac{dx}{\sqrt[4]{(x-1)^3(x+2)^5}} = k\sqrt[4]{\frac{x-1}{x+2}} + C,$ then 'k is equal to:

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{3}{4}$

D. $\frac{4}{3}$

Answer: D

Watch Video Solution