MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 52

Mathematics

1. If coefficient of x^{101} in

$1+(1+x)+(1+x)^2+...(\text{if}+(1+x)^n$

$(n \geq 100)$ is ${}^{201}C_{101}$ then value of n equals

A. 202

B. 100

C. 200

D. 201

Answer: C

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2. If z is a coplex number satisfying equation $|z+i|+|z-i|=8$ on the complex plane then maximum value of |z| is

A. 2

B. 4

C. 6

D. 8

Answer: B

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3. $\begin{vmatrix} 5\sqrt{\log_5 3} & 5\sqrt{\log_5 3} & 5\sqrt{\log_5 3} \\ 3^{-\log_{1/3}(4)} & (0.1)^{\log_{0.01}(4)} & 7^{\log_7(3)} \\ 7 & 3 & 5 \end{vmatrix}$ is

A. 0

B. $5\sqrt{\log_5 3}$

C. $2.5^{\sqrt{\log_5 3}}$

D. None of these

Answer: A

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4. If e^A is difined as

$e^A = I + A + \frac{A^2}{2!} + \ldots\ldots$ where

$= \frac{1}{2}\begin{bmatrix} f(x) & g(x) \\ g(x) & f(x) \end{bmatrix}$

$A = \begin{bmatrix} x & x \\ x & x \end{bmatrix}$ and $0 < x < 1$ is an identity matrix. Then $\int_0^1 \frac{g(x)}{f(x)} dx$ is equal

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

B. $\ln\left(e + e^{-1}\right)$

C. $\ln\left(e^2 + 1\right) - \ln 2$

D. None of these

Answer: A

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5. Let $f(x) = \left(a^2 + a + 2\right)x^2 - (a + 4)x - 7, x \in R.$

If 1 lies between the roots f equation $f(x) = 0$ then number of integral values of a is/are _____

A. 5

B. 4

C. 3

D. 2

Answer: A

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6. Let $S_n = 1^3 + 2^3 + 3^3 + \ldots . + n^3, n \in N,$ then $64S_n$ is always less than

A. $(2n-1)^4$

B. $(n+2)^4$

C. $(2n+1)^4$

D. $2(n+1)^4$

Answer: C

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7. In the letters of the word "INDEPENDENCE" are rearranged randomly, then the probability that no two E's occur together is

A. $\frac{14}{55}$

B. $\frac{1}{55}$

C. $\frac{54}{55}$

D. None of these

Answer: A

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8. The vertices of a ΔABC lie on a rectangular hyperbola such that the orthocentre of the triangle is (3,2) and the asymptotes of the rectangular hyperbola are parallel to corrdinate axes. If the two perpendicular tangents of the hyperbola intersect at (1,1), then equation of the rectangular hyperbola is

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

B. $2xy = x + 2y + 5$

C. $xy + 1 = x + y$

D. $xy + 1 = x + y$

Answer: D

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9. If a double ordinate of the parabola $y^2 = 4ax$ is of length 8a, then the triangle formed by double ordinate and line joining vertex with end points of double ordinate is a

A. equilateral triangle

B. isosceles triangle

C. right angled triangle

D. None of these

Answer: C

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10. If P,Q and R are three points with the co-ordinates (1,4),(4,2) and (m, 2m -1) respectively then the value of m for which PR + RQ is minimum will be equal to

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

B. $\frac{5}{2}$

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

D. $\frac{15}{8}$

Answer: A

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11. The equation of the plane passing through the line of intersection of the planes $x + 2y = 3$ and $y - 2z + 1 = 0$ and perpendicular to the first plane is

A. $2x - y - 10z = 9$

B. $2x - y - 9z = 10$

C. $2x - y + 10z = 11$

D. $2x - y + 7z = 11$

Answer: C

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12. Let ABC be a triangle with vertices at points A (2,3,5), B (-1,3,) and $C(\lambda, 5, \mu)$ in three dimensional space. If the median through A is equally inclined with the axes, then (λ, μ) is equal to :

A. $(10, 7)$

B. $(7, 5)$

C. $(7, 10)$

D. $(5, 7)$

Answer: C

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13. $\int \frac{1}{f(x)} dx = \log(f(x))^2 + C,$ then f (x) is

A. $x + \alpha$

B. $2x + \alpha$

C. $\frac{x}{2} + \alpha$

D. $x^2 + \alpha$

Answer: C

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14. If $\lim_{x \to \infty} \left(\sqrt{x^2 + x + 2} - ax - b\right) = 2,$

then equation of circle whose centre is (a,2b) and radius 1 unit is

A. $x^2 + y^2 + 2x + 6y + 9 = 0$

B. $x^2 + y^2 - 2x + 6y + 1 = 0$

C. $x^2 + y^2 - 2x + 6y + 9 = 0$

D. None of these

Answer: C

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15. The sum of 50 observations and sum of their squares were found to be 245 and 1401 respectively, but later on, three observations 2,3 and 5 were found to be not correct. If the incorrect observations are removed, then vartiance of remaining observations is

A. 4.25

B. 4.00

C. 3.15

D. 3.00

Answer: B

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16. $\int \frac{dx}{\sqrt[5]{(x+1)^{\frac{11}{2}}(x+2)^{\frac{9}{2}}}}$ is equal to

A. $10\left(\frac{x+2}{x+1}\right)^{\frac{1}{10}}+C$

B. $-10\left(\frac{x+2}{x+1}\right)^{\frac{1}{10}}+C$

C. $10\left(\frac{x+1}{x+2}\right)^{\frac{1}{10}}+C$

D. $-10\left(\frac{x+1}{x+2}\right)^{\frac{1}{10}}+C$

Answer: B

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17. The contrapositive of the statement : If $x = 5$ and $y = -2$ then $x - 2y = 9$ is

A. If $x - 2y = 9$ then $x = 5$ and $y = -2$

B. If $x - 2y \neq 9$ then $x \neq 5$ and $y \neq -2$

C. If $x - 2y \neq 9$ then $x \neq 5$ or $y \neq -2$

D. If $x - 2y \neq 9$ then either $x \neq 5$ or $y = -2$

Answer: C

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18. If in ΔABC, $\sin B \cos C = \frac{\sqrt{3}-1}{\sqrt{3}}$ and $\cos B \sin C = \frac{1}{\sqrt{3}}$, then the triangle is

A. isosceles

B. equilateral

C. right angled triangle

D. right angled isosceles

Answer: C

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19. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, then the value of $\frac{xy\sqrt{1-z^2} + yz\sqrt{1-x^2}zx\sqrt{1-y^2}}{\sqrt{(1-x^2)(1-y^2)(1-z^2)}}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

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20. If m be the number of direct common tangents to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 8x - 8y + 7 = 0$, then the value of $\frac{1}{m}$ is

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21. $f(x) = \begin{cases} \left(\sqrt{2} + \frac{\sin(1)}{x}\right)^{\frac{-1}{e^{|x|}}} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$

Let $n_1 =$ number of points where f (x) has local extreme when $x \neq 0$,

$n_2 =$ the vale of global minimum of f (x).

then value of $(n_1 + n_2)$ is

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22. Graphical representation of different functions is also a method of find the number of solution (s) of any equation. The number of solution of the equation $f_1(x) = f_2(x)$ is equal to the number of points of intersection of the graphs of $y = f_1(c)$ and $y = f_2(x)$. Now consider the equation $|x - 1 + |x - 2| + |x - 3\,| = k$. If $k > 2$, then the number of solutions of the given equation is/are

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23. Consider the differential equation $\frac{du}{dt} = \sin(t + u) + \cos(t + u)$. The general solution of the equation is log (t,u) = t + c.

The value of $\left[f\left(0, \frac{2\pi}{3}\right)\right]$, where [.] represents the greatest integer function, is equal to

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24. For a positive interger n,

$f_n(x) = \tan\left(\frac{x}{2}\right)(1+\sec x)(1+\sec 2x)(1+\sec 4x)\ldots(1+\sec 2^n x)$

then the value of

$f_2\left(\frac{\pi}{16}\right) + f_3\left(\frac{\pi}{32}\right) + f_4\left(\frac{\pi}{64}\right)$ is equal to

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25. Let $f(x) = x^2 + \{x\}$ where {}represents fractional part. Given that f is discontinuous at n, where n be an integral value of x is

$\lim_{x \to n^-} f(x) = p$, $\lim_{x \to n^+} f(x) = q$ and $\lim_{x \to \frac{3}{2}} f(x) = m$, then the value of (p-q) m is equal to

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26. The curve $y = ax^2 + bx + c$ passes through the point (1,2) and normal at the origin is the line y =- x. The area bounded by the curved, the tangent the origin and the line x + 1 = 0 is A sq. units. Then the valueof 18 A is equal to

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27. Define

$a_k = \left(k^2 + 1\right)k!$ and $b_k = a_1 + a_2 + a_3 + \ldots\ldots\ldots + a_k$

Let $\frac{a_{100}}{b_{100}} = \frac{m}{n}$ where m and n are relatively prime numbers. Then the value of (n-m) is :

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28. The first to two samples has 100 items with mean 15 and standard deviation 3 if the whole group has 150 items with mean

16 and . $S.D = \sqrt{8.75.}$ The value of S. D. of the second group is equal to

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