MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 107

Mathematics

1. If the trinomial expansion $\left(1+x+2x^2\right)^{20} = a_0 + a_1x + a_2x^2 + ... + a_{40}x^{40}$ then the value of $a_1 + a_3 + a_5 + ... + a_{39}$ is

A. $2^{39} - 2^{19}$

B. $2^{40} - 2^{20}$

C. $-2^{40} - 2^{20}$

D. $-2^{19} - 2^{39}$

Answer: A

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2. Let $A(a\cos\theta, b\sin\theta)$ is a variable point, $S \equiv (ap, 0)$ and $S' \equiv (a-p, 0)$ are two fixex oints where $p = \sqrt{\frac{a^2-b^2}{a^2}}$. If the locus of incentre of triangle ASS' is a conic then the eccentricity of the conic in terms of p is

A. $\sqrt{\frac{2p}{+p}}$

B. $\sqrt{\frac{p}{1+p}}$

C. $\sqrt{\frac{1-p}{1+p}}$

D. $\frac{p}{2(1+p)}$

Answer: A

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3. The value of the determinant

$$\Delta = \begin{vmatrix} \log x & \log y & \log z \\ \log 2x & \log 2y & \log 2z \\ \log 3x & \log 3y & \log 3z \end{vmatrix}$$ is

A. 0

B. log(xyz)

C. log(6xyz)

D. 6 log(xyz)

Answer: A

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4. Let A and B be two sets. Theen

A. $A \cup B \subseteq A \cap B$

B. $A \cap B \subseteq A \cup B$

C. $A \cap B = A \cup B$

D. None of these

Answer: B

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5. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points (x_i, y_i) for =1,2,3 and 4 then $y_1 + y_2 + y_3 + y_4$ equals

A. 0

B. c

C. a

D. c^4

Answer: A

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6. From first 100 natural numbers, 3 numbers are selected. If these three numbers are in A. P., then find the probability that these numbers are

even

A. $\frac{1}{66}$

B. $\frac{29}{66}$

C. $\frac{29}{49}$

D. $\frac{12}{49}$

Answer: D

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7. The ratio of the distance from (-1,1,3) and (3,2,1) to the plane 2a + 5y-7z+9 = 0 is

A. $3:2$

B. $2:3$

C. $1:3$

D. $1:2$

Answer: D

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8. Tangents are drawn from the origin to the curve y = sin a, then their point of contact lie of the curve

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

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

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

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

Answer: C

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9. z_1, z_2, z_3 and z_4 are the affixes of four points in the argand plane and z affix of a point such that $|z - z_1| = |z - z_2| = |z - z_3|$ then

$= |z - z_4|, z_1, z_2, z_3$ and z_4 are

A. concyclic

B. tices of parallelogram

C. vertices of rhombus

D. in a straight line

Answer: A

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10. The value of $\lim_{x \to \infty} \left[\frac{1^{\frac{1}{x}} + 2^{\frac{1}{x}} + 3^{\frac{1}{x}} \ldots + n^{\frac{1}{x}}}{n} \right]^{nx}$ is

A. $n!$

B. n

C. $(n-1)!$

D. 0

Answer: A

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11. The valuye of $\int_0^{\pi} \frac{dx}{1-2a\cos x+\alpha^2}$ is

A. $\frac{\pi}{1-\alpha^2}$ if $\alpha > 1$

B. $\frac{\pi}{\alpha^2-1}$ if $\alpha > 1$

C. $\frac{\pi}{\alpha^2-1}$ if $\alpha < 1$

D. $\frac{\pi}{\alpha^2-1}$ if $\alpha < 1$

Answer: B

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12. If two diameters of a circle of area 154 sq. units are 2ac-3y= 5 & 3a-4y= 7. Then the equation of circle is

A. $x2 + y2 + 2x2y = 62$

B. $x2 + y2 + 2x2y = 47$

C. $x2 + y2 - 2x + 2y = 47$

D. $x2 + y22x + 2y = 62$

Answer: C

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13. Assertion: Area bounded by y = lnx and $y = (\ln x)^2$ is $\int_1^e$ (ln $x - (\ln x)^2$) dx

Reason: Area between y= f(z) and y g() is given as

$\int_\alpha^\beta |f(x) - g(x)|dx$, where α, β are solution of f(x)=g(x)

A. If both [A] and [R] are true, and [R] is the correct explanation of [A]

B. If both [A] and [R] are true but [R] is not the correct explanation of [A].

C. If [A) is true but [R] is false.

D. if [A] is false but [R] is true.

Answer: A

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14. $\sin x \tan x \cdot \tan 4x = \cos x in x \in (0, \pi)$ is/are

A. 7

B. 6

C. 5

D. 4

Answer: C

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15. If y= f(a) passing through the point P (1, 2) and satisfies the differential equation y(1+ry)da - zdy =0, then which of the following holds true.

A. $f(x) = \frac{2x}{2 - x^2}$

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

C. $f(x) = \frac{x - 1}{(4 - x)^2}$

D. $f(x) = \frac{4x}{(1 - 2x)^2}$

Answer: A

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16. Let P(x) be a polynomial of degree 5 with leading coefficient unity. If P(1) =2, P(2) = 3 P(3) = 4, P(4) = 5 and P(5) = 6 then P(6) is equal to

A. 7

B. 127

C. 126

D. 727

Answer: B

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17. Let P(n) denote the statement that $n^2 + n$ is odd. It is seen that $P(n) \Rightarrow P(n+1)$ then P(n) is true for all

A. $n > 1$

B. $n \geq 3$

C. $n > 2$

D. None of these

Answer: D

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18. Let f(r) be a polynomial of degree 3 such that

s(3) =21, f(3) = 30, f (3) = 22 and f''' (3) = 6. Find the value of f'(2)

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19. A student has to answer a question paper that has 8 questions, each question having 2 alternatives. Given that the student has not left answer sheet blank, in how many ways the student can make selections for answering the question paper?

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20. If $a_1, a_2 \ldots\ldots a_{10}$ are positive numbers in an arithmetic progression such that $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \ldots. + \frac{1}{a_9 a_{10}} = \frac{9}{64}$ and $\frac{1}{a_1 a_{10}} + \frac{1}{a_2 a_9} + \ldots. \frac{1}{a_{10} a_1} =$ then sum of digits of $\left(4\left(\frac{a_1}{a_{10}} + \frac{a_{10}}{a_1}\right)\right)$ is

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21. If $\vec{a}$, $\vec{b}$ are vectors perpendicular to each other and $|\vec{a}| = 2, |\vec{b}| = 3\vec{c} \times \vec{a} = \vec{b}$, then the lest value of $2|\vec{c} - \vec{a}|$ is

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22. Value of the expression $16\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 100^\circ$ is

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23. If $\cos^{-1} = xa$ and $\sin^{-1}\left(2x\sqrt{1-x^2}\right) + \sec^{-1}\left(\frac{1}{2x^2-1}\right) = \frac{2\pi}{3}$ $0 < x < \frac{1}{\sqrt{2}}$ then find $\tan^{-1}(2x)$ in degrees)

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24. For the data of first 10 even natural number, evaluate variance.

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