MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 62

Mathematics

1. The greatest term in the expansion of $(3+2x)^{51}$, where $x=\frac{1}{5}$, is

A. 5^{th} term

B. 6^{th} term

C. 7^{th} term

D. 9^{th} term

Answer: C

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2. If $\Sigma_{r=1}^{n} t_r = \frac{1}{6} n(n+1)(n+2), \ \forall n \geq 1,$ then the value of $\lim_{n \to \infty} \Sigma_{r=1}^{n} \frac{1}{t_r}$ is equal to

A. 2

B. 3

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

D. 6

Answer: A

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3. If $\frac{\pi}{2} < \alpha < \frac{3\pi}{4}$, then $\sqrt{2\tan\alpha + \frac{1}{\cos^2\alpha}}$ is equal to

A. $-1 + \tan\alpha$

B. $-1 - \tan\alpha$

C. $1 + \tan\alpha$

D. $1 - \tan\alpha$

Answer: C

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4. The sum of all the solutions in $[0, 100]$ for the equation $\sin \pi x + \cos \pi x = 0$ is

A. 2550

B. 5025

C. 2525

D. 5050

Answer: B

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5. If $f(x) = \tan^{-1}\left(\frac{\ln(e/x^3)}{\ln(ex^3)}\right) + \tan^{-1}\left(\frac{\ln(e^4x^3)}{\ln(e/x^{12})}\right)(\forall x \geq e)$ incorrect statement is

A. $f(x)$ is a constant function

B. $f(x) \geq 0$

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

D. $f(x) \geq \pi$

Answer: D

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6. The function $f(x) = (\sin x)^{\tan^2 x}$ is not defined at $x = \frac{\pi}{2}$. The value of $f\left(\frac{\pi}{2}\right)$ such that f is continuous at $x = \frac{\pi}{2}$ is

A. $\sqrt{e}$

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

C. 2

D. None of these

Answer: B

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7. Which of the following statements is not a tautology?

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

B. $(p \wedge q \wedge r) \Rightarrow ((\sim p \wedge \sim q) \vee r)$

C. $(p \wedge \sim q \wedge r) \Rightarrow (\sim p \vee q \vee r)$

D. $(p \wedge q \wedge \sim r) \Rightarrow r$

Answer: D

8. The area between the curves $x = 4y - y^2$ and 0 is λ square units, then the value of 3λ is equal to

A. 28

B. 30

C. 32

D. 36

Answer: C

9. If $I_n = \int_0^2 \frac{2dx}{(1-x^n)}$, then the value of $\lim_{n \to \infty} I_n$ is equal to

A. 1

B. 2

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

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

Answer: B

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10. The solution of the differential equation $(1-x^2)\frac{dy}{dx} - xy = 1$ is (where, $|x| < 1, x \in R$ and C is an arbitrary constant)

A. $y(1-x^2)=\tan^{-1}x+C$

B. $y\sqrt{1-x^2}=\tan^{-1}x+C$

C. $y\sqrt{1-x^2}=\sin^{-1}(x)+C$

D. $y.\ (1-x^2)=\sin^{-1}x+C$

Answer: C

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11. The maximum value of $f(x)=\dfrac{\sin 2x}{\sin x+\cos x}$ in the interval $\left(0,\ \dfrac{\pi}{2}\right)$ is

A. $\sqrt{2}$

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

C. 1

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

Answer: B

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12. The integral $\int \frac{1}{(1+\sqrt{x})\sqrt{x-x^2}}dx$ is equal to (where C is the constant of integration)

A. $\frac{\sqrt{x}+1}{\sqrt{1-x}}+C$

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

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

D. $\frac{\sqrt{x}+1}{\sqrt{1+x}}+C$

Answer: C

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13. Let $L_1 : x = y = z$ and $L_2 = x - 1 = y - 2 = z - 3$ be two lines. The foot of perpendicular drawn from the origin $O(0, 0, 0)$ on L_1 to L_2 is A. If the equation of a plane containing the line L_1 and perpendicular to OA is $10x + by + cz = d$, then the value of $b + c + d$ is equal to

A. 10

B. -10

C. 12

D. -7

Answer: B

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14. If $\vec{a}, \vec{b}$ and $\vec{c}$ are three vectors, such that $|\vec{a}| = 2, |\vec{b}| = 3, |\vec{c}| = 4, \vec{a}.\vec{c} = 0, \vec{a}.\vec{b} = 0$ and the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$, then the value of $\left|\vec{a} \times \left(2\vec{b} - 3\vec{c}\right)\right|$ is equal to

A. $12\sqrt{3}$

B. $6\sqrt{3}$

C. $3\sqrt{3}$

D. 5

Answer: A

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15. If A is a skew symmetric matrix of order 3, B is a 3×1 column matrix and $C = B^T AB$, then which of the following is false?

A. C is singular

B. C is non singular

C. C is a symmetric matrix

D. C is a skew symmetric matrix

Answer: B

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16. Let P_1, P_2 and P_3 are the probabilities of a student passing three independent exams A, B and C respectively. If P_1, P_2 and P_3 are the roots of equation $20x^3 - 27x^2 + 14x - 2 = 0$, then the probability that the student passes in exactly one of A, B and C is

A. $\frac{3}{20}$

B. $\frac{7}{20}$

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

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

Answer: C

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17. Let $A \equiv (6, 7), B \equiv (2, 3) and C \equiv (-2, 1)$ be the vertices of a triangle. Find the point P in the interior of the triangle such that PBC is an equilateral triangle.

A. $(-\sqrt{3}, 2 + 2\sqrt{3})$

B. $(\sqrt{3}, 2 + 2\sqrt{3})$

C. $(\sqrt{3}, 2 - 2\sqrt{3})$

D. $(-\sqrt{3}, 2 - 2\sqrt{3})$

Answer: A

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18. If the chord of contact of the tangents from the point (α, β) to the circle $x^2 + y^2 = r_1^2$ is a tangent to the circle

$(x-a)^2+(y-b)^2=r_2^2$, then

A. $r_2^2(\alpha^2+\beta^2)=(r_1^2-a\alpha-b\beta)^2$

B. $r_2^2(\alpha^2+\beta^2)=(r_1^2+a\alpha=b\beta)^2$

C. $r_2^2(\alpha^2+\beta^2)=(r_1^2-a\alpha+b\beta)^2$

D. $r_2^2(\alpha^2+\beta^2)=(r_1^2+a\alpha+b\beta)^2$

Answer: A

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19. Tangents are drawn at the end points of a normal chord of the parabola $y^2=4ax$. The locus of their point of intersection is

A. $(x-2a)y^2+4a^3=0$

B. $(x - 2a)y^2 - 4a^3 = 0$

C. $(x + 2a)y^2 - 4a^3 = 0$

D. $(x + 2a)y^2 + 4a^3 = 0$

Answer: D

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20. Find the value of k for which the point $P(2, k)$ on the ellipse $x^2 + 2y^2 = 6$, which is nearest to the line $x + y = 7$

A. $(\sqrt{2}, \sqrt{2})$

B. $(-2, -1)$

C. $\left(\sqrt{5}, \frac{1}{\sqrt{2}}\right)$

D. $(2, 1)$

Answer: D

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21. The value of $\lim_{x \to 1} \frac{\sqrt[5]{x^2} - 2\sqrt[5]{x} + 1}{(x-1)^2}$ is equal to

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22. Let matrix $A = \begin{bmatrix} x & y & -z \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$, where $x, y, z \in N$. If $|adj(adj(adj(adjA)))| = 4^8.5^{16}$, then the number of such matrices A is equal to (where, $|M|$ represents determinant of a matrix M)

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23. If m numer of integers greater than 7000 can be formed with the digits 3, 5, 7, 8 and 9, such that no digit is being repeated, then the value of $\frac{m}{100}$ is

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24. Let $z = x + iy$ and $w = u + iv$ be two complex numbers, such that $|z| = |w| = 1$ and $z^2 + w^2 = 1$. Then, the number of ordered pairs (z, w) is equal to (where, $x, y, u, v \in R$ and $i^2 = -1$)

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25. A survey shows that 69% students like mathematics, whereas 75% like chemistry. If $x\%$ students like both the subjects, then the maximum value of x is

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