MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 79

Mathematics

1. Three balls are marked with 2, 4 and 6. They are placed in a box and a ball is drawn, its number is noted and the ball drawn is returned to the box. The process is repeated two more times. If the probability to the sum of all three numbers is 12 is λ, then 108λ is equal to

A. 28

B. 14

C. 20

D. 10

Answer: A

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2. The number of 2×2 matrices A with real entries, such that $A + A^T = 3I$ and $AA^T = 5I$, is equal to

A. 0

B. 1

C. 2

D. infinite

Answer: C

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3. The sum of the intercepts of the plane on the coordinate axes, passing through the intersection of the planes $2x + 3y + 3z - 5 = 0$ and $2x - 5y + 3z + 1 = 0$ and parallel to the line $\frac{x-1}{2} = \frac{y-2}{-5} = \frac{z-3}{-7}$, is

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

B. $\frac{11}{105}$

C. $\frac{11}{102}$

D. $\frac{3}{101}$

Answer: C

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4. If $A_r = \begin{bmatrix} \frac{1}{r(r+1)} & \frac{1}{3^r} \\ 2 & 3 \end{bmatrix}$, then $\lim_{n \to \infty} \Sigma_{r=1}^{n} |A_r|$ is equal to

A. 0

B. 2

C. 4

D. 8

Answer: B

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5. The solution of the equation $\cos^{-1} x + \cos^{-1} 2x = \frac{2\pi}{3}$ is

A. $x = \pm \frac{\sqrt{3}}{\sqrt{28}}$

B. $x = \pm \frac{\sqrt{3}}{\sqrt{26}}$

C. $x = \pm \frac{1}{\sqrt{2}}$

D. $x = \pm \frac{\sqrt{3}}{\sqrt{38}}$

Answer: A

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6. Negation of "Monu is in class X or Anu is in class XII" is

A. Monu is not in class X and Anu is in class XII

B. Monu is not in class X and Anu is not in class XII

C. Either Monu is not in class X or Anu is not in class XII

D. None of these

Answer: B

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7. The value of $\lim_{x \to 0} (\cos x + \sin bx)^{\frac{a}{x}}$ is equal to

A. e^{-ab}

B. e^{ab^2}

C. e^{ab}

D. $e^{-b^2 a}$

Answer: C

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8. If $f(x) = [x]\tan(\pi x)$ then $f'\left(k^{+}\right)$ is equal to (where k is some integer and [.] denotes greatest integer function)

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9. Consider the integrals $I = \int \frac{\sin x}{3\cos x + 4\sin x} dx$ and $J = \int \frac{\cos x}{3\cos x + 4\sin x} dx.$ Then, the integral $4J - 3J$ is equal to (where, c is the constant of integration)

A. $\ln|2\cos x - 4\sin x| + c$

B. $\ln|3\cos x + 4\sin x| + c$

C. $\ln|3\sin x + 4\cos x| + c$

D. $\ln|3\sin x - 4\cos x| + c$

Answer: B

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10. If the area bounded by $f(x) = \tan^3 x + \tan x$ from x = 0 to $x = \frac{\pi}{4}$ is k square units, then the maximum value of $g(x) = k\sin x$ is $\left(\forall x \in \left[0, \frac{\pi}{4}\right]\right)$

A. 2

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

C. 4

D. 8

Answer: B

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11. For the function $f(x) = \sin^3 x - 3\sin x + 4 \forall x \in \left[0, \frac{\pi}{2}\right]$, which of the following is true?

A. Greatest value of the function is 2π

B. Greatest value of the function is 4

C. Rolle's Theorem is applicable to $f(x)$ in $x \in \left[0, \frac{\pi}{2}\right]$

D. LMVT is not applicable to f(x) in $x \in \left[0, \frac{\pi}{2}\right]$

Answer: B

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12. The curve satisfying the differential equation $\sin\left(x^3\right)e^y dy + 3x^2\cos\left(x^3\right)e^y dx = x\sin\left(x^2\right)dx$ C is the constant of integration is $\lambda\sin\left(x^3\right)e^y + \cos\left(x^2\right) = C.$ Then, the value of λ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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13. A possible three digit even number which can be formed with the condition that If 5 is one of the digit, then 7 is next digit is :

A. 5

B. 325

C. 345

D. 265

Answer: D

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14. The discriminant of the quadratic $(2x+1)^2+(3x+2)^2+(4x+3)^2+\ldots. n$ terms

$= 0, \forall n > 3, x \in R$ is

A. positive

B. zero

C. negative

D. depends on n

Answer: C

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15. Simplify

$$P = \frac{1}{2\sqrt{1} + \sqrt{2}} + \frac{1}{3\sqrt{2} + 2\sqrt{3}} + ... + \frac{1}{100\sqrt{99} + 99\sqrt{100}}$$

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

B. $\frac{3}{10}$

C. $\frac{9}{10}$

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

Answer: C

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16. The general solution of the equation $\sin^2 x + \cos^2 3x = 1$ is equal to :

(where $n \in I$)

A. $x = \frac{n\pi}{3}$

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

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

D. $x = n\pi + \frac{\pi}{2}$

Answer: C

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17. The line $L_1 : \frac{x}{5} + \frac{y}{b} = 1$ passes through the point (13, 32) and is parallel to $L_2 : \frac{x}{c} + \frac{y}{3} = 1$. Then, the distance between L_1 and L_2 is

A. $\frac{17}{\sqrt{15}}$ units

B. $\frac{23}{\sqrt{17}}$ units

C. $\frac{23}{\sqrt{17}}$ units

D. $\frac{23}{\sqrt{15}}$ units

Answer: C

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18. $B\&C$ are fixed points having co-ordinates $(3, 0)$ and $(-3, 0)$ respectively. If the vertical angle $BAC$is 90°, thenthe locus of the centroid of the triangleABC has the equation :

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

B. $x^2 + y^2 = 2$

C. $9\left(x^2 + y^2\right) = 1$

D. $9\left(x^2 + y^2\right) = 4$

Answer: A

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19. The product of the slopes of the common tangents of the ellipse $x^2 + 4y^2 = 16$ and the parabola $y^2 - 4x - 4 = 0$ is

A. $-\frac{1}{15}$

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

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

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

Answer: B

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20. For a complex number Z, if $|Z - i| \leq 2$ and $Z_1 = 5 + 3i$, then the maximum value of

$|iZ + Z_1|$ is (where, $i^2 = -1$)

A. $7 + \sqrt{13}$

B. $7 + \sqrt{12}$

C. 7

D. $\sqrt{34} - 2$

Answer: C

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21. Consider a parabola $y^2 = 4x$ with vertex at A and focus at S. PQ is a chord of the parabola which is normal at point P. If the abscissa and the ordinate of the point P are equal, then the square of the length of the diameter of the circumcircle of triangle PSQ is

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22. if $\sum \frac{k}{k+1} \cdot {}^{100}C_k = \frac{a \cdot 2^{100} + b}{c}$ where $a, b, c \in N$ then find the least value of $a + b + c$

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23. The value of the integral $I = \int_0^{\frac{\pi}{2}} \frac{\sin^3 x - \cos^3 x}{1 + \sin^6 x \cos^6 x} dx$ is equal to

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24. If $\sqrt{x+y} + \sqrt{y-x} = 2$, then the value of $\frac{d^2y}{dx^2}$ is equal to

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25. Let $\vec{a}$ and $\vec{b}$ are vectors such that $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 3$ and $\vec{a} . \vec{b} = 4.$ If $\vec{c} = \left(3\vec{a} \times \vec{b}\right) - 4\vec{b}$, then $\left|\vec{c}\right|$ is equal to

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