MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 41

Mathematics

1. If $f(x) = (x-1)(x-2)(x-3)(x-4)(x-5)$, then the value of f' (5) is equal to

A. 0

B. 120

C. 24

D. 5

Answer: C

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2. If p, q and r anre 3 statements, then the truth value of $((-p \vee q) \wedge r) \Rightarrow p$ is

A. True if truth values of p, q, r are T, F, T respectively

B. False if truth values of p, q, r are T, F, T respectively

C. False if truth values of p, q, r are T, F, F respectively

D. False if truth values of p, q, r are T, T, T respectively

Answer: A

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3. The number of nonnegative integer solutions of the equation $x + y + z + 5t = 15$ is

A. 196

B. 224

C. 312

D. 364

Answer: B

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4. Let $f(x) = \begin{matrix} \frac{1}{x^2} & : |x| \geq 1 \\ \alpha x^2 + \beta & : |x| < 1 \end{matrix}$. If f(x) is continuous and differentiable at any point, then

A. $\alpha = 2, \beta = 1$

B. $\alpha = -1, \beta = 2$

C. $\alpha = 1, \beta = 0$

D. $\alpha = -2, \beta = 3$

Answer: B

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5. If α, β are the roots of the equation $8x^2 - 3x + 27 = 0$, then the value of $\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$ is

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

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

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

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

Answer: B

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6. $\left(1\frac{2}{3}\right)^2 + \left(2\frac{1}{3}\right)^2 + 3^2 + \left(3\frac{2}{3}\right)^2 + \ldots$.to 10 terms , the sum is :

A. $\frac{1390}{9}$

B. $\frac{1790}{9}$

C. $\frac{1990}{9}$

D. $\frac{2290}{9}$

Answer: D

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7. For a complex number Z, if all the roots of the equation $Z^3 + aZ^2 + bZ + c = 0$ are unimodular, then

A. $|a| > 3$ and $|c| = 1$

B. $|a| \leq 3$ and $|c| = 3$

C. $|a| > 3$ and $|c| = \frac{1}{3}$

D. $|a| \leq 3 \& |c| = 1$

Answer: D

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8. If A, B, C, D are four distinct point in space such that AB is not perpendicular to CD and satisfies $\overrightarrow{A}\,\overrightarrow{B}\cdot\overrightarrow{C}\,\overrightarrow{D} = k\left(\left|\overrightarrow{A}\,\overrightarrow{D}\right|^2 + \left|\overrightarrow{B}\,\overrightarrow{C}\right|^2 - \left|\overrightarrow{A}\,\overrightarrow{C}\right|^2 = \left|\overrightarrow{B}\,\overrightarrow{D}\right|^2\right)$, then find the value of k.

A. $1/2$

B. 1

C. $3/2$

D. 2

Answer: A

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9. Let a random variable X have a binomial distribution with mean 8 and variance r. If $P(X \leq 2) = \frac{k}{2^{16}}$, then k is equal to

A. 121

B. 1

C. 17

D. 137

Answer: D

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10. A tangent drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $P\left(a\sec\frac{\pi}{6}, b\frac{\tan\pi}{6}\right)$ form a triangle of area $3a^2$ sq. units with the coordinate axes. The eccentricity of the conjugate hyperbola of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

A. $\sqrt{17}$

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

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

D. $\frac{8}{\sqrt{17}}$

Answer: B

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11. If $f(x) = \tan^{-1}\left(\frac{2^x}{1+2^{2x+1}}\right)$, then $\sum_{r=0}^{9} f^r$ is

A. $\tan^{-1}(1024)$

B. $\tan^{-1}\left(\frac{1023}{1024}\right)$

C. $\tan^{-1}\left(\frac{1023}{1025}\right)$

D. None of these

Answer: C

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12. Let $A_n = \int \tan^n x dx, \forall n \in N.$ If $A_{10} + A_{12} = \frac{\tan^m x}{m} + \lambda$ (where λ is an arbitrary constant), then the value of m is equal to

A. 10

B. 11

C. 12

D. 13

Answer: B

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13. Let $f(x) = \sin^3 x - 3\sin x + 6, \forall x \in (0, \pi)$. The number of local maximum/maxima of the function f(x) is

A. 0

B. 1

C. 2

D. 3

Answer: A

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14. The angle between the chords of the circle $x^2 + y^2 = 100$, which passes through the point (7,1) and also divides the circumference of the circle into two arcs whose length are in the ratio 2 : 1, is equal to

A. $\frac{\pi}{6}$

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

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

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

Answer: C

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15. If α and β are the roots of the equation,

$$[1, 5]\begin{bmatrix} 1 & 3 \\ -4 & 7 \end{bmatrix}^2\begin{bmatrix} \frac{7}{19} & -\frac{13}{19} \\ \frac{4}{19} & \frac{1}{19} \end{bmatrix}^4$$

$$\begin{bmatrix} 1 & 3 \\ -4 & 7 \end{bmatrix}^2\begin{bmatrix} x^2 - 5x + 5 \\ -3 \end{bmatrix} = [-4],$$ then the value of $(2-\alpha)(2-\beta)$ is

A. 51

B. -12

C. 12

D. -7

Answer: B

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16. If the equal sides AB and AC (each equal to 5 units) of a right-angled isosceles triangle ABC are produced to P and Q such that $BP \cdot CQ = AB^2$, then the line PQ always passes through the fixed point (where A is the origin and AB, AC lie along the positive x and positive y - axis respectively)

A. $(7, 6)$

B. $(6, 5)$

C. $(5, 5)$

D. $(6, 6)$

Answer: C

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17. If $\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}=\frac{3}{4}$, then the value of $\frac{1+\cos\alpha+\sin\alpha}{1+\sin\alpha}$ is equal to

A. $4/3$

B. $3/4$

C. $1/4$

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

Answer: B

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18. The intercepts made on the x, y and z axes, by the plane which bisects the line joining the points `(1,2,3) and (-3, 4,5) at right angles, are a,b and c respectively, then the ordered triplet (a,b,c) is

A. $\left(\frac{-9}{2}, 9, 9\right)$

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

C. $\left(9, \frac{-9}{2}, 9\right)$

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

Answer: A

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19. The value of $\lim_{x \to \frac{\pi}{4}} (\sin 2x)^{\sec^2 x}$ is equal to

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

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

C. $e^{-1/2}$

D. $e^{1/2}$

Answer: C

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20. If a, b and c are distinct positive real numbers such that $\Delta_1 = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} bc - a^2 & ac - b^2 & ab - c^2 \\ ac - b^2 & ab - c^2 & bc - a^2 \\ ab - c^2 & bc - a^2 & ac - b^2 \end{vmatrix}$, then

A. $\Delta_1 = \Delta_2$

B. $\Delta_1^2 + \Delta_2 = 0$

C. $\Delta_1^2 = \Delta_2$

D. $\Delta_1^2 = \Delta_2^2$

Answer: C

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21. If $\lim_{x \to 0} \frac{x(1 + a\cos x) - b\sin x}{x^3} = 1$, then the value of ab is euqal to

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22. If the solution of the differential equation $x^2 dy + 2xydx = \sin x dx$ is $x^k y + \cos x = C$ (where C is an arbitrary constant), then the value of k is equal to

A. 0

B. 1

C. 2

D. 3

Answer: C

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23. If the normals at two points P and Q of a parabola $y^2 = 4x$ intersect at a third point R on the parabola $y^2 = 4x$, then the product of the ordinates of P and Q is equal to

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24. The coefficient of t^{50} in $(1+t)^{41}\left(1-t+t^2\right)^{40}$ is equal to

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25. Let $f: R \to R$ is a function defined as $f(x)$ where $= \begin{cases} |x-[x]| & : [x] \text{is odd} \\ |x-[x+1]| & : [x] \text{is even} \end{cases}$

[.] denotes the greatest integer function, then $\int_{-2}^{4} dx$ is equal to

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