MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 58

Mathematics

1. The value of the numerically greatest term in the expansion of $(4-3x)^7$ when $x=\frac{2}{3}$ is equal to

A. 71680

B. 35840

C. 10752

D. 86016

Answer: D

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2. Out of 10 white, 8 black and 6 red balls, the number of ways in which one or more balls can be selected is (assuming balls of the same colour are identical)

A. 681

B. 691

C. 679

D. 692

Answer: D

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3. If $\log_2(5.2^x + 1), \log_4\left(2^{1-x} + 1\right)$ and 1 are in A.P,then x equals

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

B. $\log_2 0.6$

C. $1 - \frac{\log 5}{\log 2}$

D. $\frac{\log 2}{\log 5}$

Answer: C

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4. Consider $I_1 = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{e^{\sin x} + 1}{e^{\cos x} + 1} dx$ and $I_2 = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{e^{\cos x} + 1}{e^{\sin x} + 1} dx$, then

A. $I_1 > I_2$

B. $I_1 < I_2$

C. $I_1 = I_2$

D. $I_1 + I_2 = 0$

Answer: A

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5. Let $f(x) = \lim_{n \to \infty} \frac{\left(x^2 + 2x + 4 + \sin \pi x^n\right) - 1}{\left(x^2 + 2x + 4 + \sin \pi x^n\right) + 1}$, then

A. $f(x)$ is continuous and differentiable for all $x \in R$.

B. $f(x)$ is continuous but not differentiable for all $x \in R$.

C. $f(x)$ is discontinuous at infinite number of points.

D. f(x) is discontinuous at two points.

Answer: A

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6. The equation of the common tangent to the parabolas $y^2 = 2x$ and $x^2 = 16y$ is

A. $2x + y - 2 = 0$

B. $x - 2y - 2 = 0$

C. $x - 2y + 2 = 0$

D. $x + 2y + 2 = 0$

Answer: D

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7. If p, q and r are three logical statements then the truth value of the statement $(p \wedge \sim q) \vee (q \rightarrow r)$, where p is true, is

A. True if q is true

B. False if q is true

C. True if q is false

D. False is q is false

Answer: C

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8. The mean of five observation is 4 and their variance is 2.8. If three of these observations are 2, 2 and 5, then the other two are

A. 2 and 9

B. 3 and 8

C. 4 and 7

D. 5 and 6

Answer: D

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9. If the integral $\int \frac{\ln x}{x^3} dx = \frac{f(x)}{4x^2} + C$, where $f(e) = -3$ and C is the constant of integration, then the value of $f\left(e^2\right)$ is equal to

A. 3

B. -4

C. -5

D. 5

Answer: C

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10. If $S_n = \Sigma_{r=1}^{n} t_r = \frac{1}{6} n\left(2n^2 + 9n + 13\right)$, then $\Sigma_{r=1}^{n} \sqrt{t_r}$ is equal to

A. $\frac{1}{2} n(n+1)$

B. $\frac{1}{2} n(n+3)$

C. $(n+1)^2$

D. n^2

Answer: B

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11. A cone having fixed volume has semi - vertical angle of $\frac{\pi}{4}$. At an instant when its height it decreasing at the rate of 2m/s, its radius increases at a rate equal to

A. 2m/s

B. 4m/s

C. 1m/s

D. 8m/s

Answer: C

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12. Let the lines $4x - 3y + 10 = 0$ and $4x - 3y - 30 = 0$ make equal intercepts of 6 units with a circle (C) whose centre lies on $2x + y = 0$, then the equation of the circle C is

A. $x^2 + y^2 - 2x + 4y - 20 = 0$

B. $x^2 + y^2 - 4x + 8y - 20 = 0$

C. $x^2 + y^2 + 2x - 4y - 20 = 0$

D. $x^2 + y^2 - 4x + 8y - 5 = 0$

Answer: A

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13. A biased coin is tossed repeatedly until a tail appears for the first time. Heads is 3 times as likely to appear as tails. Let x be the number of tosses required. Assume that all the trials of tossing a biased coin are independent. Then, the conditional probability that $x \geq 6$, gives that $x > 3$, is equal to

A. $\frac{9}{16}$

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

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

D. $\frac{3}{5}$

Answer: A

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14. If $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ are two matrices, then the value of the determinant $\left(A + A^2B^2 + A^3 + A^4B^4 + \ldots\ldots\ldots 20 \text{ terms}\right)$

A. $(20)^3$

B. $2(20)^3$

C. $-(20)^3$

D. 0

Answer: D

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15. Consider three vectors

$\vec{V_1} = (\sin\theta)\hat{i} + (\cos\theta)\hat{j} + (a-3)\hat{k}$, $\vec{V_2} = (\sin\theta + \cos\theta) + \hat{i} + (\cos\theta - si$

and $+(b-4)\hat{k}$

$\vec{V_3} = (\cos\theta)\hat{i} + (\sin\theta)\hat{j} + (c-5)\hat{k}$. If the resultant of $\vec{V_1}, \vec{V_2}$ and $\vec{V_3}$ is equal to $\lambda\hat{i}$, where $\theta \in [-\pi, \pi]$ and $a, b, c \in N$, then the number of quadruplets (a, b, c, θ) are

A. 55

B. 110

C. 91

D. 182

Answer: B

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16. Let $Z = x + iy$ is a complex number, such that $x^2 + y^2 = 1$. In which of the following cases $\frac{Z}{1-Z}$ $(\text{for } x \neq 1)$ lies in the II^{nd} quadrant?

$(\forall x, y \in R, i^2 = -1)$

A. $x > 0$

B. $x < 0$

C. $y > 0$

D. $y < 0$

Answer: C

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17. The point $(a^2, a+1)$ lies in the angle between the lines $3x + y + 1 = 0$ and $x + 2y - 5 = 0$ containing the origin. If a is an integer, then the sum of all possible values of a is

A. -2

B. -3

C. -1

D. 2

Answer: B

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18. The area (in sq. units) bounded by the curve $y = \max(x, \sin x), \forall x \in [0, 2\pi]$ is

A. π^2

B. $2\pi^2$

C. 2

D. 4

Answer: B

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19. The value of $\lim_{x \to 0} \frac{\cos(\tan x) - \cos x}{4x^4}$ is equal to

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

B. $-\frac{1}{12}$

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

D. 1

Answer: B

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20. The minimum value of x which satisfies the inequality $\left(\sin^{-1} x\right)^2 \geq \left(\cos^{-1} x\right)^2$ is

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

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

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

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

Answer: A

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21. The number of solutions of the equation $\tan^2 x - \sec^{10} x + 1 = 0$ for $x \in (0, 20)$ is equal to

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22. If the solution of the differential equation $\left(1 + e^{\frac{x}{y}}\right) dx + e^{\frac{x}{y}} \left(1 - \frac{x}{y}\right) dy = 0$ is $x + kye^{\frac{x}{y}} = C$ (where, C is an arbitrary constant), then the value of k is equal to

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23. The equation of the plane passing through the poit of intersection of the lines $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2}, \frac{x-3}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ and perpendicular to the line $\frac{x-2}{2}=\frac{y-3}{3}=\frac{z-2}{1}$ is P = 0. If the distance of the point $(1,1,3)$ from P = 0 is k units, then the value of $\frac{k^2}{2}$ is equal to

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24. Let $A=\left[a_{ij}\right]_{3\times 3}$ be a matrix, where $a_{ij}=\begin{cases} x & \in ej \\ 1 & i=j \end{cases} Aai, j \in N \& i, j \leq 2.$ If C_{ij} be the cofactor of a_{ij} and $C_{12}+C_{23}+C_{32}=6$, then the number of value(s) of $x(\forall x \in R)$ is (are)

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25. Let the eccentricity of the hyperbola with the principal axes along the coordinate axes and passing through (3, 0) and $\left(3\sqrt{2}, 2\right)$ is e, then the

value of $\left(\frac{e^2+1}{e^2-1}\right)$ is equal to

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