MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 73

Mathematics

1. The value of $(n+2).^{n}C_0.2^{n+1} - (n+1).^{n}C_1.2^{n} + (n).^{n}C_2.2^{n-1} - \ldots..$ to $(n+1)$ terms is equal to

A. 4

B. 4n

C. $4(n+1)$

D. $2(n+2)$

Answer: C

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2. Let a, b and c satisfy the system of equations

$a+2b+3c=6, 4a+5b+6c=12 \text{ rad } 6a+9b=4$. If the roots of the equation $(a+b+c)x^2-abcx$ are α and $\beta+\left(a^{-1}+b^{-1}+c^{-1}\right)=0$ then $\frac{1}{\alpha}+\frac{1}{\beta}$ is equal to

A. 243

B. 100

C. $\frac{243}{12}$

D. $\frac{100}{243}$

Answer: D

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3. If $a, b, andc$ are in A.P. and one root of the equation $ax^2 + bc + c = 0is2,$ the find the other root.

A. $\frac{3}{4}$

B. $-\frac{3}{4}$

C. $-\frac{5}{4}$

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

Answer: C

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4. If $\sin^6\theta + \cos^6\theta + k\cos^2 2\theta = 1,$ then $k =$

A. $\frac{1}{2}\tan^2 2\theta$

B. $\frac{1}{4}\tan^2 2\theta$

C. $4\cot^2\theta$

D. $\frac{3}{4}\tan^2 2\theta$

Answer: D

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5. Let $f(x) = |x|$ and $g(x) = [x]$, (where $[.]$ denotes the greatest integer function) Then, $(fog)'(-1)$ is

A. 0

B. does not exist

C. -1

D. 1

Answer: B

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6. The length of the radius of the circle which touches the x - axis at the point (1, 0) and passes through the point (2, 3) is

A. $\frac{10}{3}$ units

B. $\frac{3}{5}$ units

C. $\frac{6}{5}$ units

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

Answer: D

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7. Let $x_1, x_2, \ldots x_n$ be n observations such that $\Sigma x_i^2 = 500$ and $\Sigma x_1 = 100$. Then, an impossible value of n among the following is

A. 24

B. 18

C. 29

D. 22

Answer: B

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8. Two vertical poles AL and BM of height 25 m and 100 m respectively stand apart on a horizontal plane. If A, B be the feet of the poles and AM and BL intersect at P, then the height of P from the horizontal plane is equal to

A. 20 m

B. 18 m

C. 16 m

D. 15 m

Answer: A

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9. A multiple - choice question has 5 options of which only one is correct. If a student does home work, then he is sure to identify the correct answer, otherwise the answer is chosen at random. Let A ne the event that the student does his home work and B be the event that the student answers correctly. If $P(A) = \frac{2}{3}$, then $P\left(\frac{A}{B}\right)$ is euqal to

A. $\frac{10}{11}$

B. $\frac{4}{5}$

C. $\frac{3}{7}$

D. $\frac{6}{7}$

Answer: A

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10. If the line $\frac{x-1}{1} = \frac{y-k}{-2} = \frac{z-3}{\lambda}$ lies in the plane $3x + 4y - 2z = 6$, then $5|k| + 3|\lambda|$ is equal to

A. 75

B. $\frac{75}{4}$

C. 15

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

Answer: B

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11. If

$a_1^2 + a_2^2 + a_3^2 = 1, b_1^2 + b_2^2 + b_3^2 = 4, c_1^2 + c_2^2 + c_3^2 = 9, a_1b_1 + a_2b_2 + a_3b_3 =$

, then $|A|^4$ is equal to

A. 36

B. 49

C. 1296

D. 216

Answer: C

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12. The number of ways of selecting two distinct numbers from the first 15 natural numbers such that their sum is a multiple of 5, is equal to

A. 20

B. 36

C. 21

D. 16

Answer: C

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13. The number of possible straight lines passing through point(2,3) and forming a triangle with coordiante axes whose area is 12 sq. unit is: a. one

b. two c. three d. four

A. 1

B. 2

C. 3

D. 4

Answer: C

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14. If p and q are logical statements, then $(p \wedge q) \rightarrow (p \rightarrow q)$ is equivalent to

A. $p \wedge q$

B. $p \rightarrow (p \vee q)$

C. $p \vee q$

D. $(p \vee q) \leftrightarrow (p \wedge q)$

Answer: B

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15. The curve having differential equation, $x\cos y\frac{dy}{dx}+\sin y=x$ and passing through the origin, also passes through

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

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

C. $\left(4,\frac{3\pi}{2}\right)$

D. $\left(-8,\frac{3\pi}{2}\right)$

Answer: A

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16. If z_1, z_2 and z_3 are the vertices of a triangle in the argand plane such that $|z_1-z_2|=|z_1-z_3|$, then $\left|arg\left(\frac{2z_1-z_2-z_3}{z_3-z_2}\right)\right|$ is

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

B. 0

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

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

Answer: C

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17. The range of the function $f(x) = x^2 \ln(x)$ for $x \in [1, e]$ is $[a, b]$, where $a + b$ is equal to

A. e^2

B. $e^2 + 1$

C. $e + 1$

D. $2e^2$

Answer: A

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18. Consider $I_1 = \int_{10}^{20} \frac{\ln x}{\ln x + \ln(30 - x)} dx$ and $I_2 = \int_{20}^{30} \frac{\ln x}{\ln x + \ln(50 - x)} dx$. Then, the value of $\frac{I_1}{I_2}$ is

A. 10

B. 2

C. 1

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

Answer: C

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19. The length of the intercept cut by the line $4x + 4\sqrt{3}y - 1 = 0$ between the curve $y^2 = x$ is equal to

A. 4

B. 9

C. 12

D. 16

Answer: A

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20. The area (in sq. units) bounded by $[|x|] + [|y|] = 2$ in the first and third quardant is (where $[.]$ is the greatest integer function).

A. 4

B. 3

C. 6

D. 10

Answer: C

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21. Let an ant starts from the origin (O) and travels 2 units on negative x - axis, 3 units on positive y - axis and travels 3 units on negative z - axis to reach at point A. If $\vec{a} = \hat{i} - 3\hat{j} + 2\hat{k}$ and $\vec{b}$ be such that the resultant of $\vec{a}$ and $\vec{b}$ is $3\hat{i} - 4\hat{j} + \hat{k}$, then $\left|\overrightarrow{OA} \times \left(\vec{a} \times \vec{b}\right)\right|^2$ is equal to

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22. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinates axes. Another ellipse E_2 passing through the point (0, 4) circumscribes the rectangle R. The length (in units) of the major axis of ellipse E_2 is

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23. Let $I = \int \frac{dx}{\left(\cos x - \sin x^2\right)} = \frac{1}{f(x)} + C$ (where, C is the constant of integration). If $f\left(\frac{\pi}{3}\right) = 1 - \sqrt{3}$, then the number of solution(s) of

$f(x) = 2020$ in $x \in \left(\frac{\pi}{2}, \pi\right)$ is/are

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24. If the function $f(x) = \cos^{-1}\left(x^{\frac{3}{2}} - \sqrt{1 - x - x^2 + x^3}\right)$(where, $\forall 0 < x < 1$), then the value of $\left|\sqrt{3} f'\left(\frac{1}{2}\right)\right|$ is equal to $(\text{take } \sqrt{3} = 1.73)$

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25. Let three positive numbers a, b c are in geometric progression, such that a, $b + 8$, c are in arithmetic progression and $a, b + 8, c + 64$ are in geometric progression. If the arithmetic mean of a, b, c is k, then $\frac{3}{13}k$ is equal to

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