MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 42

Mathematics

1. The number of positive integral solution of the inequality $x + y + z \leq 20$ is

A. 1008

B. 1028

C. 1108

D. 1140

Answer: D

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2. A tower AB leans towards west making an angle α with vertical. The angular elevation of B, the top most point of the tower, is 60° as observed from a point C due east of A at a elevation of 10 ft from A. If the angular elevation of B from a point D due east of C at a distance of 20 ft from C is 45°, then the value of $2\tan\alpha$ is equal to

A. $\sqrt{3}+1$

B. $\dfrac{\sqrt{3}+1}{\sqrt{\sqrt{3}-1}}$

C. $\sqrt{3}-1$

D. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$

Answer: C

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3. Consider the function $f(x) = \min\left\{\left|x^2 - 9\right|, \left|x^2 - 1\right|\right\}$, then the number of points where $f(x)$ is non - differentiable is/are

A. 0

B. 7

C. 6

D. 4

Answer: C

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4. The consecutive odd integers whose sum is $45^2 - 21^2$ are

A. 43, 45,....., 75

B. 43, 45, ... , 85

C. 43, 45, ... , 85

D. 43, 45, ... , 89

Answer: D

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5. For a complex number Z, if one root of the equation $Z^2 - aZ + a = 0$ is $(1 + i)$ and its other root is α, then the value of $\frac{a}{\alpha^4}$ is equal to

A. 4

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

C. 2

D. -2

Answer: B

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6. Let $\vec{\alpha} = \frac{1}{a}\hat{i} + \frac{4}{b}\hat{j} + b\hat{k}$ and $\vec{\beta} = b\hat{i} + a\hat{j} + \frac{1}{b}\hat{k}(Aaa, b > 0)$, then the maximum value of $\frac{12}{6 + \vec{\alpha}.\vec{\beta}}$ is

A. $\frac{12}{11}$

B. 2

C. 1

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

Answer: A

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7. If 2 data sets having 10 and 20 observation have coefficients of variation 50 and 60 respectively and arithmetic means 30 and 25 respectively, then the combined variance of those 30 observation is

A. $\frac{2075}{3}$

B. $\frac{2075}{9}$

C. $\frac{1000}{9}$

D. $\frac{1075}{3}$

Answer: B

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8. |[alpha]+[beta]+[gamma]|, where [.]` denotes the integer function, is equal to

A. -1

B. 1

C. 4

D. -3

Answer: D

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9. If $2, h_1, h_2, \ldots\ldots\ldots, h_{20}6$ are in harmonic progression and $2, a_1, a_2, \ldots\ldots\ldots, a_{20}, 6$ are in arithmetic progression, then the value of $a_3 h_{18}$ is equal to

A. 6

B. 12

C. 3

D. 9

Answer: B

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10. In $\sin A$ and $\cos A$ are the roots of the equation $4x^2 - 3x + a = 0, \sin A + \cos A + \tan A + \cot A + \sec A + \text{cosec } A = 7$, then the value of a must be

A. $\frac{7}{25}$

B. $\frac{25}{7}$

C. $\frac{28}{25}$

D. $\frac{25}{28}$

Answer: C

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11. The statement $p \Leftrightarrow q$ is not equivalent to

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

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

C. $(p \vee q) \Leftrightarrow (p \wedge q)$

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

Answer: B

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12. The curve represented by $x = 3(\cos t + \sin t)$, $y = 4(\cos t - \sin t)$, is

A. $\frac{9}{2}$ units

B. $9\sqrt{2}$ units

C. $\frac{32\sqrt{2}}{3}$ units

D. $\frac{9}{\sqrt{2}}$ units

Answer: D

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13. The plane $4x + 7y + 4z + 81 = 0$ is rotated through a right angle about its line of intersection with the plane $5x + 3y + 10z = 25$. If the equation of the plane in its new position is $x - 4y + 6z = K$, then the value of K is

A. 106

B. -89

C. 73

D. 37

Answer: A

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14. The lengths of the perpendiculars from the points $\left(m^2, 2m\right), (mn, m+n)$ and $\left(n^2, 2n\right)$ to the line $x+\sqrt{3}y+3=0$ are in

A. Arithmetic progression

B. Geometric progression

C. Harmonic progression

D. None of these

Answer: B

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15. The value of $\int_0^\infty \frac{dx}{1+x^4}$ is equal to

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

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

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

D. $2\pi\sqrt{2}$

Answer: A

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16. The coefficient of x^5 in the expansion of $\left(1+\frac{x}{1!}+\frac{x^2}{2!}+\frac{x^3}{3!}+\frac{x^4}{4!}+\frac{x^5}{5!}\right)^2$ is

A. $\frac{2}{15}$

B. $\frac{4}{15}$

C. $\frac{1}{30}$

D. $\frac{2}{45}$

Answer: B

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17. Which of the following equations of a line intercepts on the circle $x^2 + y^2 - 6x - 8 = 0$ a chord of longest length?

A. $y - x = 0$

B. $x + y = 0$

C. $x + y = 2$

D. $3x + 4y - 2 = 0$

Answer: A

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18. The value of the integral $\int e^{x^2+\frac{1}{2}}\left(2x^2-\frac{1}{x}+1\right)dx$ is equal to (where C is the constant of integration)

A. $e^{x^2+\frac{1}{x}}+C$

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

C. $xe^{x^2+\frac{1}{x}}+C$

D. $x.\ e^x+C$

Answer: C

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19. If $A \neq B, AB = BA$ and $A^2 = B^2$, then the value of the determinant of matrix $A+B$ is (where A and B are square matrices of order 3×3)

A. 0

B. 1

C. 3^3

D. 3^2

Answer: A

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20. The locus of the mid-point of the chords of the hyperbola $x^2 - y^2 = 4$, that touches the parabola $y^2 = 8x$ is

A. $x^2(x-2) = y^3$

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

C. $x^3(x-2) = y^2$

D. $y^3(x-2) = x^2$

Answer: B

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21. The area bounded by the curve $y = \{x\}$ with the x-axis from $x = \pi$ to $x = 3.8$ is $\left(\frac{\pi}{2} - a\right)(b - \pi)$ sq. units, then the value of $b - a$ is equal to (where $\{.\}$ denotes the fractional part function)

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22. Consider the function $f(x) = \tan^{-1}\left\{\frac{3x-2}{3+2x}\right\}, \forall x \geq 0$. If $g(x)$ is the inverse function of $f(x)$, then the value of $g'\left(\frac{\pi}{4}\right)$ is equal to

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23. If $\int e^{-\frac{x^2}{2}} dx = f(x)$ and the solution of the differential equation $\frac{dy}{dx} = 1 + xy$ is $y = ke^{\frac{x^2}{2}} f(x) + Ce^{\frac{x^2}{2}}$, then the value of k is equal to (where C is the constant of integration)

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24. A subset of 5 elements is chosen from the set of first 15 natural numbers. The probability that at least two of the five numbers are consecutive is λ, then the value of $\frac{22}{\lambda}$ is equal to

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25. If $a, b, c, \lambda \in N$, then the least possible value of $\begin{vmatrix} a^2+\lambda & ab & ac \\ ba & b^2+\lambda & bc \\ ca & cb & c^2+\lambda \end{vmatrix}$ is

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