MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 29

Mathematics

1. Vectors $3\vec{a} - 5\vec{b}$ and $2\vec{a} + \vec{b}$ are mutually perpendicular. If $\vec{a} + 4\vec{b}$ and $\vec{b} - \vec{a}$ are also mutually perpendicular, then the cosine of the angle between $\vec{a}$ nad $\vec{b}$ is

A. $\cos^{-1}\left(\frac{19}{5\sqrt{43}}\right)$

B. $\pi - \cos^{-1}\left(\frac{19}{5\sqrt{43}}\right)$

C. $\cos^{-1}\left(\frac{9}{5\sqrt{43}}\right)$

D. $\pi - \cos^{-1}\left(\frac{9}{5\sqrt{43}}\right)$

Answer: A

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2. If a_1, a_2, a_3 are in arithmetic progression and d is the common diference, then $\tan^{-1}\left(\frac{d}{1+a_1a_2}\right) + \tan^{-1}\left(\frac{d}{1+a_2a_3}\right) =$

A. $\tan^{-1}\left(\frac{2d}{1+a_1a_3}\right)$

B. $\tan^{-1}\left(\frac{d}{1+a_1a_3}\right)$

C. $\tan^{-1}\left(\frac{2d}{1+a_2a_3}\right)$

D. $\tan^{-1}\left(\frac{2}{1-a_1a_3}\right)$

Answer: A

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3. The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=\frac{1}{(1+\ln x+\ln y)^2}$ is (where, c is an arbitrary constant)

A. $xy\left[1+\left(\ln(xy)^2\right)\right]=\frac{x^2}{2}+c$

B. $1+(\ln(xy))^2=\frac{x^2}{2}+y+c$

C. $xy(1+\ln(xy))=\frac{x^2}{2}+c$

D. $xy(1+\ln(xy))=\frac{x}{2}+c$

Answer: A

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4. If p ∵ '4 is an odd number" and q : "4^3 is an even number" are two statements, then which of the following statements is equivalent to ~$(p \Rightarrow q)$?

A. '4 is an odd number and 4^3 is an even number"

B. The negation of the statement "4 is not an odd number of 4^3 is not an even number"

C. Both ("4 is an odd number and 4^3 is an even number") and (The negation of the stateement "4 is not an odd number of 4^3 is not an even number")

D. '4 is an odd number and 4^3 is not an even number"

Answer: D

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5. Tangents are drawn to the circle $x^2 + y^2 = 16$ at the points where it intersects the circle $x^2 + y^2 - 6x - 8y - 8 = 0$, then the point of intersection of these tangents is

A. $\left(4, \frac{16}{3}\right)$

B. $(12, 16)$

C. $(3, 4)$

D. $(16, 12)$

Answer: B

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6. A closed cylindrical can has to be made with $100m^2$ of plastic. If its volume is maximum, then the ratio of its radius to the height is

A. $1:1$

B. $1:2$

C. $2:1$

D. $\sqrt{2}:1$

Answer: B

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7. If A and B are non- singular square matrix of same order 3×3, then which of the following options is correct?

A. $|adj(AB)| = |A||B|$

B. $\left|(adjAB)^{-1}\right| = |adj(AB)|$

C. $\left|adj(AB)^{-1}\right| = \left|adj(AB)^{-1}\right|$

D. $\left|adj(AB)^{T}\right| = |AB|^{-2}$

Answer: C

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8. The area (in sq. units) enclosed by the graphs of $|x+y|=2$ and $|x|=1$ is

A. 2

B. 4

C. 6

D. 8

Answer: D

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9. The sum to n terms of

$$\left[\frac{1}{1.3}+\frac{2}{13.5}+\frac{3}{1.3.5.7}+\frac{4}{1.3.5.7.9}+\ldots\ldots\ldots\ldots\right]$$

A. $\frac{1}{2}\left[1+\frac{1}{1.3.5.\ldots\ldots(2n+1)}\right]$

B. $\frac{1}{2}\left[1-\frac{1}{2.4.6.\ldots\ldots.2n}\right]$

C. $\frac{1}{2}\left[1-\frac{1}{1.3.5.\ldots\ldots\ldots(2n+1)}\right]$

D. None of these

Answer: C

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10. The value of P for which both the roots of the equation $4x^2 - 20Px + \left(25P^2 + 15P - 66\right) = 0$ are less than 2, lies in

A. $\left(\frac{4}{5}, 2\right)$

B. $(0, 2)$

C. $\left(-1, -\frac{4}{5}\right)$

D. $(-\infty, -1)$

Answer: D

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11. Let $g(x) = |x - 2|$ and $h(x) = g(g(x))$ be two functions, then the value of $h'(-1) + h'(1) + h'(3) + h'(5)$ is equal to (where, h' denotes the derivative of h)

A. 2

B. -1

C. 0

D. 1

Answer: C

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12. A card is lost from a pack of 52 playing cards. From remainder of the pack of a card is drawn and is found to be a spade. The probability that the misssing card is spade, is

A. $\frac{5}{17}$

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

C. $\frac{3}{17}$

D. $\frac{2}{17}$

Answer: B

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13. Suppose S and S' are foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$. If P is a variable point on the ellipse and if Δ is the area (in sq. units) of the triangle PSS' then the maximum value of Δ is double of

A. Minimum value of $\frac{2a^8+2b^4}{a^4b^2}\ \forall a,b\in R$

B. Minimum value of $\frac{3a^8+3b^4}{a^4b^2}\ \forall a,b\in R$

C. $\frac{4a^8+4b^4}{a^4b^2}\ \forall a,b\in R$

D. $\frac{6a^8+6b^4}{a^4b^2}\ \forall a,b\in R$

Answer: B

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14. If $\cot(\alpha+\beta)=0$, then $\sin(\alpha+2\beta)$ is equal to

A. $\sin\alpha$

B. $\cos\alpha$

C. $\sin\beta$

D. $\cos 2\beta$

Answer: A

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15. The value of $\Delta = \begin{vmatrix} 1 & \sin 3\theta & \sin^3\theta \\ 2\cos\theta & \sin 6\theta & \sin^3 2\theta \\ 4\cos^2\theta - 1 & \sin 9\theta & \sin^3 3\theta \end{vmatrix}$ equal to

A. -2

B. -1

C. 1

D. 0

Answer: D

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16. $\lim_{x \to 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is equal to

A. 1

B. 2

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

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

Answer: B

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17. The number of 7 digit integers abcdefg, where $a < b < c < d > e > f > g$ such that a, b, c, d, e, f, g in {1,2,3,.....,9}`. Are

A. 700

B. 20

C. 720

D. 800

Answer: C

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18. If $\int_{\frac{-1}{\sqrt{3}}}^{1/\sqrt{3}} \frac{x^4}{1-x^4}\cos^{-1}\left(\frac{2x}{1+x^2}\right)dx = k,$ then $\int_0^{1/\sqrt{3}} \frac{x^4}{1-x^4}dx$ the value of k is equal to

A. π

B. 2π

C. $-\pi$

D. 3π

Answer: A

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19. If $(9a, 6a)$ is a point bounded in the region formed by parabola $y^2 = 16x$ and $x = 9$, then

A. $a \in (0, 1)$

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

C. $a < 1$

D. $0 < a < 4$

Answer: A

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20. Let $P_1 : x - 2y + 3z = 5$ and $P_2 : 2x - 3y + z + 4 = 0$ be two planes. The equation of the plane perpendicular to the line of intersection to the line of intersection of $P_1 = 0$ and $P_2 =$ and passing through $(1, 1, 1)$ is

A. $11x - 5y + 7z - 13 = 0$

B. $7x + 5y + z = 13$

C. $x + 2y + z - 4 = 0$

D. $x - 2t + 4z + 3 = 0$

Answer: B

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21. If the 6th term in the expansion of $\left[\frac{1}{x^{\frac{8}{3}}}+x^2\log_{10}x\right]^8$ is 5600, then x =

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22. If $f(x)$ is the antidervative of $\left(1+2\tan x(\tan x+\sec x)^{\frac{1}{2}}\right)$ and $f\left(\frac{\pi}{6}\right)=\log 2$, then the value of $f(0)$ is

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23. Let $f(x) = \sin\left(\frac{x}{3}\right) + \cos\left(\frac{3x}{10}\right)$ for all real x. Find the least natural number n such that $f(n\pi + x) = f(x)$ for all real x.

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24. If $x + \frac{1}{x} = 1$ and$p = x^{4000} + \frac{1}{x^{4000}}$ and q is the digit at unit place in the number $2^{2^n} + 1, n \in Nabdn > 1$, then p + q is .

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25. If variance of first n natural number is 10 and variance of first m even natural number is 16 then the value of m+n is

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