MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 111

Mathematics

1. The value of $\frac{d}{dx}\left[\tan^{-1}\left(\frac{\sqrt{x}(3-x)}{1-3x}\right)\right]$ is , if $\in R-\left\{\frac{1}{3}\right\}$

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

B. $\frac{3}{(1+x)\sqrt{x}}$

C. $\frac{2}{(1+x)\sqrt{x}}$

D. $\frac{3}{2(1+x)\sqrt{x}}$

Answer: D

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2. The angle between the tangents drawn from the point (1, 4) to the parabola $y^2 = 4x$ is

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

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

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

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

Answer: C

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3. Negation of $\sim s \vee (\sim r \wedge s)$ is

A. $s \wedge \sim r$

B. $s \wedge (r \wedge \sim s)$

C. $g \vee (r \vee \sim s)$

D. $s \wedge r$

Answer: D

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4. In a third order determinant, each element of the first column consists of sum of two terms, each element of the

second column consists of sum of three terms and each element of third column consists of sum of four terms. Then, it can be decomposed in n determinants, where n has the value

A. 24

B. 16

C. 9

D. 1

Answer: A

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5. Let n(A) = 4 and n(B) = 6, then number of one-one functions from A to Bis

A. 120

B. 360

C. 24

D. none of these

Answer: B

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6. Which set is the subset of all given sets

A. $\{1, 2, 3, 4, \ldots\ldots\}$

B. $\{1\}$

C. $\{0\}$

D. $\{\}$

Answer: D

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7. A straight line touches the rectangular hyperbola $9x^2 - 9y^2 = 8$ and the parabola $y^2 = 32x$. An equation of the line is

A. $9x + 3y - 8 = 0$

B. $9x - 3y + 8 = 0$

C. $9x - 3y + 4 = 0$

D. $9x - 3y - 8 = 0$

Answer: B

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8. A bag contains 5 white and 8 red balls, two draws of 3 balls are made without replacement. Then, the probability that first draw gives 3 white but second draw gives no white ball, is

A. $\frac{7}{429}$

B. $\frac{1076}{2145}$

C. $\frac{140}{(143)^2}$

D. $\frac{1041}{2145}$

Answer: A

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9. If a vector has direction cosines $\left(\frac{1}{2}, m, \frac{1}{2}\right)$ and makes an obtuse angle θ with the y-axis , then θ is equal to

A. $\pi/4$

B. $3\pi/2$

C. $3\pi/4$

D. $\pi/6$

Answer: C

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10. The value of the limit

$$\left\{\frac{\left(1-\cos\frac{1}{n}\right)}{\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\ldots.\infty\right)}}}\right\}$$

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

B. -2

C. 2

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

Answer: A

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11. Let f (x) is continuous on [a,c] and differentiable in (a,c) where a,b,c are real numbers : $a < b < c$. $Iff'(x)$ is strictly increasing function and

$(c-b)f(a)+(b-a)f(c)=k,$ then

A. $k > (c-a)f(b)$

B. $k < (c-a)f(b)$

C. $k = (c-a)f(b)$

D. $k \leq 2(c-a)f(b)$

Answer: A

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12. If the function

$f(x) = Pe^{2x} + Qe^{x} + Rx$ satisfies the conditions

$f(0) = -1, f'(\log_e 2) = 31$ and $\int_0^{\log_e 4} (f(x) - Rx)dx = \frac{39}{2}$,

then

A. $P = 5, Q = -6, R = 3$

B. $P = -5, Q = 6, R = 3$

C. $P = 5, Q = 6, R = 3$

D. $P = 3, Q = 2, R = 3$

Answer: A

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13. If a circle passes through the points (0, 0) (a, 0) and (0, b), then its centre will be

A. (a, b)

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

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

D. $(-a, -b)$

Answer: B

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14. If $3\sin\theta - 4\cos\theta = 5$ and $4\sin\theta + 3\cos\theta = k$. then k^2 is equal to

A. 0

B. 1

C. 4

D. 25

Answer: A

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15. Let $\theta \in \left(0, \frac{\pi}{2}\right)$ is solution of equation $3\sin x + 4\cos x = 4(\sin 18^\circ + \cos 36^\circ)^2$ then $\sin\theta + \cos\theta$, is equal to

A. $3/5$

B. $4/5$

C. $7/5$

D. $1/5$

Answer: C

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16. $\cos^{-1}\{\cos(2\cot^{-1}(\sqrt{2}-1))\}$ is equal to

A. $\sqrt{2}-1$

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

C. $\frac{3\pi}{4}$

D. 0

Answer: C

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17. Let L_1 be a straight line passing through the origin and L_2 be the straight line x + y = 1. If the intercepts made by the circle $x^2 + y^2 - x + 3y = 0 on L_1$ and L_2 are equal, then which of the following equation can represent L_1 ?

A. $x + 7y = 0$

B. $x - y = 0$

C. $x - 7y = 0$

D. Both (a) and (b)

Answer: D

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18. The roots α and β of the quadratic equation $px^2 + qx + r = 0$ are real and of opposite signs. The roots of $\alpha(x - \beta)^2 + \beta(x - \alpha)^2 = 0$ are

A. positive

B. negative

C. of opposite signs

D. non-real

Answer: C

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19. The sum $S_n = n^3 + 3n^2 + 5n + 3$ is divisible by

A. $3 \forall n \in N$

B. $4 \forall n \in N$

C. $5 \forall n \in N$

D. Can't be determined

Answer: A

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20. If $1+\frac{1}{3^2}+\frac{1.4}{1.2}.\frac{1}{3^4}+\frac{1.4.7}{1.2.3}.\frac{1}{3^6}+\ldots$ then $=(a)^{\frac{1}{3}}$, find the value of a.

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21. Words are formed from the letters of the word BHARAT. If p and qrepresent the number of words having bothA's together

and the number of words having two A's never together respectively, then evaluate $\frac{p}{q}$

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22. If $A = \begin{bmatrix} -1 & 2 & -3 \\ -2 & 0 & 3 \\ 3 & -3 & 1 \end{bmatrix}$ be a matrix such that $|A| adj\left(A^{-1}\right) = KA$, then find the value of K.

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23. $0 < A, B, C < \pi$, find the minimum value of II $\left(\frac{\sin^2 A + \sin A + 1}{\sin A}\right)$

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24. For certain curve y = f (x) satisfying $\frac{d^2y}{dx^2} = 6x - 4$, a relative minimum value dx2 of 5, occurs at ct = 1. Find the global maximum value of function f, for $x \in [0, 2]$

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25. If ω is a complex cube root of unity, then evaluate $\left|\omega + \omega\left(\frac{1}{5} + \frac{9}{50} + \frac{81}{500} + \frac{729}{5000} + \ldots.\right)\right|$.

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26. If $\int \sin^2 x \cos^4 x dx = \frac{p}{32}\left[\frac{\sin 6x}{m} = \frac{\sin 4x}{n} + \frac{\sin 2x}{k} + qx\right] + c$ then $\pm + knq =$ ____.

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27. A curve Cis given by

$(f(y))^{\frac{2}{3}} + (f(x))^{\frac{1}{3}} = 0,$ satisfies, the equation

$(x-y)f(x+y) - (x+y)f(x-y)$ Then $= 4xy(x^2 - y^2).$

area of the region bounded by curve C and the line a = -3, in sq. units, is A. Find $\frac{A^2}{2}$.

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28. For a series, the value of mean deviation is 21. Find the value of its quartile deviation (Q.D.).

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29. Consider the differential equation

$\left(\frac{2+\sin x}{y+1}\right)\frac{dy}{dx} = -\cos x.$ If $y(0) = 1,$ then evaluate $6y\left(\frac{\pi}{2}\right) + 5$

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