MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 43

Mathematics

1. If α and β are the roots of the equation $2x^2 + 4x - 5 = 0$, then the equation whose roots are $\frac{1}{2\alpha - 3}$ and $\frac{1}{2\beta - 3}$ is

A. $x^2 + 10x - 11 = 0$

B. $11x^2 + 10x + 1 = 0$

C. $x^2 + 10x + 11 = 0$

D. $11x^2 - 10x + 1 = 0$

Answer: B

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2. If $f: A \to B$ defined by $f(x) = \sin x - \cos x + 3\sqrt{2}$ is an invertible function, then the correct statement can be

A. $A = \left[\frac{\pi}{4}, \frac{5\pi}{4}\right], B = \left[3\sqrt{2}, 4\sqrt{2}\right]$

B. $A = \left[\frac{-\pi}{4}, \frac{5\pi}{4}\right], B = \left[2\sqrt{2}, 4\sqrt{2}\right]$

C. $A = \left[\frac{-\pi}{4}, \frac{3\pi}{4}\right], B = \left[\sqrt{2}, 4\sqrt{2}\right]$

D. $A = \left[\frac{-\pi}{4}, \frac{3\pi}{4}\right], B = \left[2\sqrt{2}, 4\sqrt{2}\right]$

Answer: D

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3. Three numbers a, b and c are in between 2 and 18 such that 2, a, b are in A.P. and b, c, 18 are in G.P . If $a + b + c = 25$, then the value of $c - a$ is

A. 4

B. 3

C. 7

D. 0

Answer: C

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4. If the sum of the coefficients in the expansion of $(1+3x)^n$ lies between 4000 and 10000, then the value of the greatest coefficient must be

A. 3954

B. 6342

C. 4806

D. 1458

Answer: D

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5. In a shooting competition a man can score 5, 4, 3, 2, 1 or 0 points for each shot. Then the number of different ways in which he can score 10 in seven shots is

A. 6538

B. 6648

C. 6468

D. 6236

Answer: A

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6. If $4\sin 26^\circ = \sqrt{\alpha} - \sqrt{\beta}$, then the value of $\alpha + \beta$ is

A. 5

B. 3

C. 8

D. 2

Answer: C

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7. If $\int \frac{dx}{\sqrt{e^x - 1}} = 2\tan^{-1}(f(x)) + C$, (where $x > 0$ and C is the constant of integration) then the range of $f(x)$ is

A. $(0, \infty)$

B. $[0, \infty)$

C. $[1, \infty)$

D. $(1, \infty)$

Answer: A

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8. Consider $I(\alpha) = \int_{\alpha}^{\alpha^2} \frac{dx}{x}$ (where $\alpha > 0$), then the value of $\Sigma_{r=2}^{5} I(r) + \Sigma_{k=2}^{5} I\left(\frac{1}{k}\right)$ is

A. 0

B. 1

C. ln 2

D. ln 4

Answer: A

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9. If the mean and the variance of the numbers a, b, 8, 5 and 10 are 6 and 6.8 respectively, then the value of $a^3 + b^3$ is equal to

A. 58

B. 61

C. 91

D. 89

Answer: C

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10. If the solution of the differential equation $y^3x^2\cos\left(x^3\right)dx + \sin\left(x^3\right)y^2dy = \frac{x}{3}dx$ is $2\sin\left(x^3\right)y^k = x^2 + C$ (where C is an arbitrary constant), then the value of k is equal to

A. 3

B. 2

C. 1

D. 4

Answer: A

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11. If $\frac{\cos^{-1}(n)}{2\pi} > \frac{2\pi}{3}$ then maximum and minimum values of integer in

are respectively

A. 3

B. 4

C. -4

D. -3

Answer: C

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12. The value of $f(0)$ such that the function $f(x) = \frac{\sqrt[3]{1+2x} - \sqrt[4]{1+x}}{x}$

is continuous at x = 0, is

A. $\frac{1}{12}$

B. $\frac{5}{12}$

C. 0

D. $\frac{9}{12}$

Answer: B

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13. If m_1 and m_2 are slopes of the tangents to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ which passes through (5, 4), then the value of $(m_1 + m_2) - (m_1 m_2)$ is equal to

A. $\frac{47}{9}$

B. $-\frac{40}{6}$

C. $\frac{22}{3}$

D. $\frac{11}{3}$

Answer: D

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14. Let $\vec{a}$ and $\vec{b}$ be non collinear vectors of which $\vec{a}$ is a unit vector. The angle of the triangle whose sides are represented by $\sqrt{3}\left(\vec{a} \times \vec{b}\right)$ and $\vec{b} - \left(\vec{a} . \vec{b}\right)\vec{a}$ are:

A. $\frac{\pi}{2}, \frac{\pi}{4}, \frac{\pi}{4}$

B. $\frac{\pi}{2}, \frac{\pi}{3}, \frac{\pi}{6}$

C. $\frac{\pi}{2}, \frac{5\pi}{12}, \frac{\pi}{12}$

D. $\frac{\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{12}$

Answer: B

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15. There are 6 positive numbers and 8 negative numbers. Three numbers are chosen from them at random and multiplied. The probability that the product is a negative number is

A. $\frac{11}{34}$

B. $\frac{17}{33}$

C. $\frac{16}{35}$

D. $\frac{11}{35}$

Answer: D

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16. The image of the line $\frac{x}{2}=\frac{y-1}{5}=\frac{z+1}{3}$ in the plane $x+y+2z=3$ meets the $xz-$ plane at the point (a, b, c), then the value of c is equal to

A. $\frac{11}{6}$

B. $\frac{129}{6}$

C. $\frac{115}{6}$

D. $\frac{232}{6}$

Answer: B

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17. A square matrix A of order 3 satisfies $A^2 = I - 2A$, where I is an identify matrix of order 3. If $A^n = 29A - 12I$, then the value of n is equal to

A. 3

B. 4

C. 5

D. 6

Answer: C

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18. The perimeter of a parallelogram whose sides are represented by the lines $x + 2y + 3 = 0$,

$3x + 4y - 5 = 0, 2x + 5 = 0$ and $3x + 4y - 10 = 0$ is equal to

A. $\frac{5}{2} + 5\sqrt{5}$ units

B. $5 + 4\sqrt{5}$ units

C. $5 + \frac{5}{2}\sqrt{5}$ units

D. $\frac{5 + 5\sqrt{5}}{2}$ units

Answer: A

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19. If the length of the tangents from P(1, 3) and Q (3, 7) to a circle are $\sqrt{2}$ units and $\sqrt{18}$ units respectively, then the length of the tangent from R(7, 15) to the same circle is

A. $\sqrt{98}$ units

B. $\sqrt{170}$ units

C. $\sqrt{50}$ units

D. None of these

Answer: B

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20. The length of the chord $y = \sqrt{3}x - 2\sqrt{3}$ intercepted by the parabola $y^2 = 4(x - 1)$ is equal to

A. $4\sqrt{3}$ units

B. $\frac{8}{3}$ units

C. $\frac{16}{3}$ units

D. $\frac{4}{\sqrt{3}}$ units

Answer: C

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21. If $|Z-2|=2|Z-1|$, then the value of $\frac{Re(Z)}{|Z|^2}$ is (where Z is a complex number and $Re(Z)$ represents the real part of Z)

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22. If

$(1)(2020)+(2)(2019)+(3)(2018)+\ldots\ldots+(2020)(1)=2020\times 2021\times$

then the value of $\frac{k}{100}$ is equal to

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23. The function $f(x)=e^{x^3-6x^2+10}$ attains local extremum at x = a and x = b (a < b), then the value of $a+b$ is equal to

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24. If $L = \lim_{x \to \frac{\pi}{4}} \frac{(1 - \tan x_1 - \sin 2x)}{(1 + \tan x)(\pi - 4x)^3}$, then the value of 40 L is equal to

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25. If A and B are square matrices of order 3 such that $\mathrm{A}\mathrm{A}^T = 3B$ and $2AB^{-1} = 3A^{-1}B$, then the value of $\frac{|B|^2}{16}$ is equal to

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