MATHS

BOOKS - NIKITA MATHS (HINGLISH)

MHT-CET 2017

Mcq

1. The statement pattern $(\sim p \wedge q)$ is logically equivalent to

A. $(p \vee q) \vee \sim p$

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

C. $(p \wedge q) \rightarrow p$

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

Answer: B

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2. If g(x) is the inverse function of f(x) and $f'(x) = \frac{1}{1+x^4}$, then $g'(x)$ is

A. $(1+g(x))^4$

B. $(1-g(x))^4$

C. $1+(f(x))^4$

D. $\frac{1}{1+(g(x))^4}$

Answer: A

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3. The inverse of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$ is

A. $\frac{-1}{3}\begin{bmatrix} -3 & 0 & 0 \\ 3 & 1 & 0 \\ 9 & 2 & -3 \end{bmatrix}$

B. $\frac{-1}{3}\begin{bmatrix} -3 & 0 & 0 \\ 3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

C. $\frac{-1}{3}\begin{bmatrix} 3 & 0 & 0 \\ 3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

D. $\frac{-1}{3}\begin{bmatrix} -3 & 0 & 0 \\ -3 & -1 & 0 \\ -9 & -2 & 3 \end{bmatrix}$

Answer: B

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4. if $\int \frac{1}{\sqrt{9-16x^2}}dx = \alpha \sin^{-1}(\beta x) + c.$ then $\alpha + \frac{1}{\beta} =$

A. 1

B. $\frac{7}{12}$

C. $\frac{19}{12}$

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

Answer: A

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5. O(0,0), A(1,2), B(3,4) are the vertices of ΔOAB. The joint equation of the altitude and median drawn from O is

A. $x^2 + 7xy - y^2 = 0$

B. $x^2 + 7xy + y^2 = 0$

C. $3x^2 - xy - 2y^2 = 0$

D. $3x^2 + xy - 2y^2 = 0$

Answer: D

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6. If $\int \frac{1}{(x^2+4)(x^2+9)} dx = A \tan^{-1}\frac{x}{2} + B\tan^{-1}\left(\frac{x}{3}\right) + C$, then A-B=

A. $\frac{1}{6}$

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

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

D. $\frac{-1}{6}$

Answer: A

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7. If α and β are the roots of the equation $x^2 + 5|x| - 6 = 0$, then the value of the $\left|\tan^{-1}\alpha - \tan^{-1}\beta\right|$ is

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

B. 0

C. π

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

Answer: A

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8. If $x = a\left(t - \frac{1}{t}\right), y = a\left(t + \frac{1}{t}\right)$, where t be the parameter, then $\frac{dy}{dx} = ?$

A. $\frac{y}{x}$

B. $\frac{-x}{y}$

C. $\frac{x}{y}$

D. $\frac{-y}{x}$

Answer: C

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9. The point on the curve $y = \sqrt{x-1}$ where the tangent is perpendicular to the line $2x + y - 5 = 0$ is

A. $(2, -1)$

B. $(10, 3)$

C. $(2, 1)$

D. $(5, -2)$

Answer: C

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10. If $\int\sqrt{\frac{x-5}{x-7}}dx = A\sqrt{x^2-12x+35} + \log\left|x-6+\sqrt{x^2-12x+35}\right| + C$, then

A. -1

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

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

D. 1

Answer: D

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11. The number of principal solutions of $\tan 2\theta = 1$ is

A. One

B. Two

C. Three

D. Four

Answer: B

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12. The objective function, $z = 4x_1 + 5x_2$, subject to $2x_1 + x_2 \geq 7, 2x_1 + 3x_2 \leq 15, x_2 \leq 3, x_1, x_2 \geq 0$ has minimum value at the point

A. on X-axis

B. on Y-axis

C. at the origin

D. on the line parallel to X-axis

Answer: A

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13. If z_1 and z_2 are z-coordinates of the points of trisection of the segment joining the points A(2,1,4), B(-1,3,6_, then $z_1 + z_2 +$

A. 1

B. 4

C. 5

D. 10

Answer: D

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14. The maximum value of $f(x) = \frac{\log x}{x} (x \neq 0, x \neq 1)$ is

A. e

B. $\frac{1}{e}$

C. e^2

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

Answer: B

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15. $\int_0^1 x \tan^{-1} x dx =$

A. $\frac{\pi}{4} + \frac{1}{2}$

B. $\frac{\pi}{4} - \frac{1}{2}$

C. $\frac{1}{2} - \frac{\pi}{4}$

D. $\frac{-\pi}{4} - \frac{1}{2}$

Answer: B

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16. If c denotes the contradication, then dual of the compound statement $\sim p \wedge (q \vee c)$ is

A. $\sim p \vee (q \wedge t)$

B. $\sim p \wedge (q \vee t)$

C. $p \vee (\sim p \vee t)$

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

Answer: A

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17. All parabolas whose axis is the Y-axis.

A. $x\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$

B. $x\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

C. $\frac{d^2y}{dx^2} - y = 0$

D. $\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$

Answer: A

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18. $\int_0^3 [x]dx = \ldots,$ where [x] is greatest integer function.

A. 3

B. 0

C. 2

D. 1

Answer: A

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19. The objective function off LPP defined over the convex set attains it optimum value at

A. at least two of the corner points

B. all the corner points

C. at least one of the corner points

D. none of the corner points

Answer: C

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20. IF the inverse of the matrix $\begin{bmatrix} \alpha & 14 & -1 \\ 2 & 3 & 1 \\ 6 & 2 & 3 \end{bmatrix}$ does not exist then the value of α is

A. 1

B. -1

C. 0

D. -2

Answer: D

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21. Find the value of k, if the function f given by :

$$f(x) = \left[\tan\left(\frac{\pi}{4} + x\right)^{\frac{1}{x}}\right], \quad \text{for} x \neq 0$$

$$= k, \qquad \text{for} x = 0$$

is continous at $x = 0$.

A. e

B. e^{-1}

C. e^{2}

D. e^{-2}

Answer: C

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22. For a invertible matrix A if $A(adjA) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ then $|A| =$

A. 100

B. -100

C. 10

D. -10

Answer: C

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23. The solution of the differential equation $\frac{dy}{dx} = \tan\left(\frac{y}{x}\right) + \frac{y}{x}$ is

A. $\cos\left(\frac{y}{x}\right) = cx$

B. $\sin\left(\frac{y}{x}\right) = cx$

C. $\cos\left(\frac{y}{x}\right) = cy$

D. $\sin\left(\frac{y}{x}\right) = cy$

Answer: B

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24. In ΔABC, if $\sin^2 A + \sin^2 B = \sin^2 C$ and $l(AB) = 10,$ then the maximum value of the area of ΔABC is

A. 50

B. $10\sqrt{2}$

C. 25

D. $25\sqrt{2}$

Answer: C

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25. If $x = f(t)$ and $y = g(t)$, then write the value of $\frac{d^2y}{dx^2}$.

A. $\frac{f'(t)g''(t) - g'(t)f''(t)}{(f'(t))^3}$

B. $\frac{f'(t)g''(t) - g'(t)f''(t)}{(f'(t))^2}$

C. $\frac{g'(t)f''(t) - f'(t)g''(t)}{(f'(t))^3}$

D. $\frac{g'(t)f''(t) + f'(t)g''(t)}{(f'(t))^3}$

Answer: A

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26. A r.v. $X \sim B$ (n, p). If values of mean and variance of X are 18 and 12 respectively, then total number of possible values of X are

A. 54

B. 55

C. 12

D. 18

Answer: B

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27. The area of the reggion bounded by the lines $y = 2x + 1, y = 3x + 1$ and $x = 4$ is

A. 16 sq. units

B. $\frac{121}{3}$ sq. units

C. $\frac{121}{6}$ sq. units

D. 8 sq. units

Answer: D

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28. A box contains 6 pens , 2 of which are defective Two pens are taken randomy from the bax .If r,v. X., : Number of defective pens obtained , then standard deviation of x=

A. $\pm \frac{4}{3\sqrt{5}}$

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

C. $\frac{16}{45}$

D. $\frac{4}{3\sqrt{5}}$

Answer: D

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29. If the volume of spherical ball is increasing at the rate of 4π cc/s, then the rate of change of its surface area when the volume is 288 π cc is

A. $\frac{4\pi}{3}$ $\mathrm{cm}^2/\mathrm{sec}.$

B. $\frac{2\pi}{3}$ $\mathrm{cm}^2/\mathrm{sec}.$

C. 4π $\mathrm{cm}^2/\mathrm{sec}.$

D. 2π $\mathrm{cm}^2/\mathrm{sec}.$

Answer: A

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30. If $f(x) = \log\left(\sec^2 x\right)^{\cot 2}$ for $x \neq 0$ for x=0 is continuous at x=0, then K is

A. e^{-1}

B. 1

C. e

D. 0

Answer: B

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31. If the origin and the points P(2,3,4), Q(1,2,3) and R(x,y,z) are coplanar, then

A. $x - 2y - z = 0$

B. $x + 2y + z = 0$

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

D. $2x - 2y + z = 0$

Answer: C

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32. if lines represented by equation $px^2 - qy^2 = 0$ are distinct, then

A. $pq > 0$

B. $pq < 0$

C. $pq = 0$

D. $p + q = 0$

Answer: A

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33. Let $\square PQRS$ be a quadrilateral. If M and N are the mid-points of the sides PQ and RS respectively, then PS+QR=

A. $3\overline{MN}$

B. $4\overline{MN}$

C. $2\overline{MN}$

D. $2\overline{NM}$

Answer: C

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34. If slopes of lines represented by $kx^2 + 5xy + y^2 = 0$ differ by 1, then k=

A. 2

B. 3

C. 6

D. 8

Answer: C

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35. If vector r wiith dc's l,m,n is equally inclined to the coordinate axes, then the total number of such vectors is

A. 4

B. 6

C. 8

D. 2

Answer: C

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36. The particular solution of the differential equation x dy+2y dx=0, then x=2, y=1 is

A. xy = 4

B. $x^2y = 4$

C. $xy^2 = 4$

D. $x^2y^{2=4}$

Answer: B

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37. ABC is a triangle and $A = (235)\dot{B} = (-1, 3, 2) and C = (\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of $\lambda and \mu$.

A. 10, 7

B. 9, 10

C. 7, 9

D. 7, 10

Answer: D

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38. For the following distribution function F (X) of a r.v. X

X	1	2	3	4	5	6
F (X)	0.2	0.37	0.48	0.62	0.85	1

$P(3 < X \leq 5) =$

A. 0.48

B. 0.37

C. 0.27

D. 1.47

Answer: B

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39. The lines $\frac{x-1}{2} = \frac{y+1}{2} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ intersect each other at point

A. $(-2, -4, 5)$

B. $(-2, -4, -5)$

C. $(2, 4, -5)$

D. $(2, -4, -5)$

Answer: B

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40. $\int \frac{\sec^8 x}{\text{cosec x}} dx =$

A. $\frac{\sec^8 x}{8} + c$

B. $\frac{\sec^7 x}{7} + c$

C. $\frac{\sec^6 + x}{6} + c$

D. $\frac{\sec^9 x}{9} + c$

Answer: B

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41. The equation of line equally inclined to coordinate axes and passing through (-3,2,-5) is

A. $\frac{x+3}{1}=\frac{y-2}{1}=\frac{z+5}{1}$

B. $\frac{x+3}{-1}=\frac{y-2}{1}=\frac{5+z}{-1}$

C. $\frac{x+3}{-1}=\frac{y-2}{1}=\frac{z+5}{1}$

D. $\frac{x+3}{-1}=\frac{2-y}{1}=\frac{z+5}{-1}$

Answer: B

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42. If $\int_0^{\pi/2}\log(\cos x)dx=\frac{\pi}{2}\log\left(\frac{1}{2}\right)$, then $\int_0^{\pi/2}\log(\sec x)dx=$

A. $\frac{\pi}{2}\log\left(\frac{1}{2}\right)$

B. $1-\frac{\pi}{2}\log\left(\frac{1}{2}\right)$

C. $1+\frac{\pi}{2}\log\left(\frac{1}{2}\right)$

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

Answer: D

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43. A boy tosses faiir coin 3 times. If he gets Rs 2X for X heads, then his expected gain equals to Rs.....

A. 1

B. $\frac{3}{2}$

C. 3

D. 4

Answer: C

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44. Which of the following statement patten is a tautology ?

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

B. $\sim q \rightarrow \sim p$

C. $(q \rightarrow p) \vee (\sim p \leftrightarrow q)$

D. $p \vee \sim p$

Answer: C

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45. If the angle between the planes $\bar{r}.\left(m\hat{i} - \hat{j} + 2\hat{k}\right) + 3 = 0$ and $\bar{r}.\left(2\hat{i} - m\hat{j} - \hat{k}\right) - 5 = 0$ is $\frac{\pi}{3}$, then m =

A. 2

B. ± 3

C. 3

D. -2

Answer: C

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46. If $f(x) = x$ for $x \leq 0 = 0$ for $x > 0$, then $f(x)$ at $x = 0$ is

A. continuous but not differentibale

B. not continuous but differentibale

C. continuous and differentiable

D. not continuous and not differentiable

Answer: A

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47. The equation of the plane through (-1,1,2), whose normal makes equal acute angles with coordinate axes is

A. $\bar{r}.\left(\hat{i}+\hat{j}+\hat{k}\right)=2$

B. $\bar{r}.\left(\hat{i}+\hat{j}+\hat{k}\right)=6$

C. $\bar{r}.\left(3\hat{i}-3\hat{j}+3\hat{k}\right)=2$

D. $\bar{r}.\left(\hat{i}-\hat{j}+\hat{k}\right)=3$

Answer: A

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48. Probability that a person will develop immunity after vaccinations is 0.8. if 8 people are givenn the vaccine, then probability that all develop immunity is=

A. $(0.2)^8$

B. $(0.8)^8$

C. 1

D. ${}^{8}C_{6}(0.2)^{6}(0.8)^{2}$

Answer: B

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49. If the distance of points $2\hat{i}+3\hat{t}j+\lambda\hat{k}$ from the plane $r\cdot\left(3\hat{i}+2\hat{j}+6\hat{k}\right)=13$ is 5 units, then $\lambda=$

A. $6, \frac{-17}{3}$

B. $6, \frac{17}{3}$

C. $-6, \frac{-17}{3}$

D. $-6, \frac{17}{3}$

Answer: A

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50. The value of $\cos^{-1}\left(\cot\left(\frac{\pi}{2}\right)\right) + \cos^{-1}\left(\sin\left(\frac{2\pi}{3}\right)\right)$ is

A. $\frac{2\pi}{3}$

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

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

D. π

Answer: A

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