MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

SOLVED PAPER 2019

Mcqs

1. If $P(x_1, y_1)$ is a point on the hyperbola $x^2 - y^2 = a^2$, then $SP.\,S'P = \ldots.$

A. $\dfrac{x_1^2 - y_1^2}{a^2}$

B. $\dfrac{x_1^2 - y_1^2}{a^2}$

C. $x_1^2 - y_1^2$

D. $x_1^2 - y_1^2$

Answer: D

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2. If $f(x) = \cos^{-1}\left[\frac{1-(\log x)^2}{1+(\log x)^2}\right]$, then the value of $f'(e)$ is equal to........

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

B. $\frac{2}{e^2}$

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

D. 1

Answer: A

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3. Find the differential equation of all the circles whose radius is one unit.

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. If $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and $A = A^{-1}$, then x= ....

A. 0

B. 4

C. 2

D. 1

Answer: A

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5. Which of the following function is not continuous at x=0?

A. $f(x)(1+2x)^{1/x}, x \neq 0$

$= e^2, x = 0$

B. $f(x) = \sin x - \cos x, x \neq 0$

$= -1, x = 0$

C. $f(x) = \dfrac{e^{1/x} - 1}{e^{1/x} + 1}, x \neq 0$

$= -1, x = 0$

D. $f(x) = \dfrac{e^{5x} - e^{2x}}{\sin 3x}, x \neq 0$

$= 1, x = 0$

Answer: C

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6. It is observed that 25% of the cases related to child labour reported to the polic station are solved. If 6 new cases are reported, then the probability that atleast 5 of them will be solved is

A. $\left(\frac{1}{4}\right)^6$

B. $\frac{19}{1024}$

C. $\frac{19}{2048}$

D. $\frac{19}{4096}$

Answer: D

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7. For a GP, If $S_n = \frac{4^n - 3^n}{3^n}$, then $t_2 = \dots$

A. $\frac{1}{9}$

B. $\frac{2}{9}$

C. $\frac{7}{9}$

D. $\frac{4}{9}$

Answer: D

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8. The area of the region bounded by the curve $y = 2x - x^2$ and the line $y = x$ is

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

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

C. $\frac{1}{3}$

D. $\frac{7}{6}$

Answer: A

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9. The general solution of $x\frac{dy}{dx}=y-x\tan\left(\frac{y}{x}\right)$ is ....

A. $x^2\sin\left(\frac{x}{y}\right)=c$

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

C. $x\sin\left(\frac{y}{x}\right)=c$

D. $x^2\sin\left(\frac{y}{x}\right)=c$

Answer: C

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10. The logical statement $[\sim(\sim p\vee q)\vee(p\wedge r)]\wedge(\sim q\wedge r)$ is equivalent to

(a) $(\sim p\wedge\sim q)\wedge r$ (b) $\sim p\vee r$ (c) $(p\wedge r)\wedge\sim q$ (d) $(p\wedge\sim q)\vee r$

A. r

B. q

C. $p\wedge q$

D. p

Answer: B

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11. A bag contains 6 white and 4 black balls. Two balls are drawn at random. The probability that they are of the same color is

A. $\frac{5}{7}$

B. $\frac{1}{7}$

C. $\frac{7}{15}$

D. $\frac{1}{15}$

Answer: C

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12. $\int \frac{\cos x + x \sin x}{x^2 + x \cos x} dx = \ldots.$

A. $\log\left|\frac{x \sin x}{x + \cos x}\right| + c$

B. $\log\left|\frac{x}{x + \cos x}\right| + c$

C. $\log\left|\frac{x \sin x}{x + \cos x}\right| + c$

D. $\log\left|x^2 + x \cos x\right| + c$

Answer: B

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13. A stone is dropped into a pond. Waves in the form of circles are generated and radius of outermost ripple increases at the rate of 5 cm/sec. then area increased after 2 sec is . . .

A. 100 $\pi cm^2 / \sec$

B. $40 cm^2 / \sec$

C. $50 cm^2 / \sec$

D. $25cm^2 / \sec$

Answer: A

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14. If $f(x) = 3x - 2$ and $g(x) = x^2$, then (fog)(x)= . . .

A. $3x^2 - 2$

B. $3x^2 + 2$

C. $3x - 2$

D. $2 - 3x^2$

Answer: A

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15. Which of the following is not equivalent to $p \rightarrow q$.

A. p only if q

B. q is necessary for p

C. q only if p

D. p is suficient for q

Answer: C

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16. The value of $\int_{-3}^{3}(ax^5+bx^3+cx+k)dx,$ where a,b,c,k are constants, depends only on. . . .

A. a, b and c

B. k

C. a and b

D. a and k

Answer: B

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17. The general solution of the differential equation of all circles having centre at A(-1,2) is

A. $x^2+y^2+x-2y+c=0$

B. $x^2+y^2-2x+4y+c=0$

C. $x^2+y^2-x+2y+c=0$

D. $x^2+y^2+2x-4y+c=0$

Answer: D

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18. If A is a non-singular matrix such that $(A-2I)(A-4I)=0$, then $(A+8A^{-1})$ = ...

A. I

B. 0

C. $3I$

D. $6I$

Answer: D

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19. If $G(3, -5, r)$ is centroid of triangle ABC where $A(7, -8, 1), B(p, q, 5)$ and $C(q+1, 5p, 0)$ are vertices of a triangle then values of p,q,r are respectively

A. 6,5,4

B. $-4, 5, 4$

C. $-3, 4, 3$

D. $-2, 3, 2$

Answer: D

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20. $\int \frac{1}{(x^2+1)^2} dx =$

A. $\tan^{-1} x \frac{1}{2x(x^2+1)} + c$

B. $\frac{1}{2}\tan^{-1} x + \frac{x}{2(x^2+1)} + c$

C. $\tan^{-1} x + \frac{1}{x^2+1} + c$

D. $\tan^{-1} x + \frac{1}{2x^2+1} + c$

Answer: B

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21. If $\theta = \frac{17\pi}{3}$ then, $\tan\theta - \cot\theta = \dots$

A. $\frac{1}{2\sqrt{3}}$

B. $\frac{-1}{2\sqrt{3}}$

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

D. $-\frac{2}{\sqrt{3}}$

Answer: D

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22. Derivative of $\log_{e^2}(\log x)$ with respect to x is . . .

A. $\frac{2}{x\log x}$

B. $\frac{1}{x\log x}$

C. $\frac{1}{x\log x^2}$

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

Answer: C

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23. In ΔABC, with usual notations, if $\cos A=\frac{\sin B}{\sin C}$, then the triangle is

A. Acute angled triangle

B. Equilateral triangle

C. Obtuse angled triangle

D. Right angled triangle

Answer: D

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24. In a GP if the $(m+n)th$ term is p and $(m-n)th$ term is q then mth term is

A. pq

B. $\sqrt{pq}$

C. $\frac{p}{q}$

D. $\frac{q}{p}$

Answer: B

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25. A random variable X has following probability distribution

$X = x$	1	2	3	4	5	6
$P(X = x)$	K	$3K$	$5K$	$7K$	$8K$	K

Then $P(2 \leq X < 5)$= . . . .

A. $\frac{3}{5}$

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

C. $\frac{23}{25}$

D. $\frac{24}{25}$

Answer: A

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26. The area bounded by the coordinate axes and normal to the curve $y = \log_e x$ at the point P(1 , 0), is

A. $2x + y = 2$

B. $x - 2y = 1$

C. $x - y = 1$

D. $x + y = 1$

Answer: D

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27. The value of $x \in \left(0, \frac{\pi}{2}\right)$ satisfying the equation $\sin x \cos x = \frac{1}{4}$ are . . .

A. $\frac{\pi}{6}, \frac{\pi}{12}$

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

C. $\frac{\pi}{8}, \frac{3\pi}{8}$

D. $\frac{\pi}{8}, \frac{\pi}{4}$

Answer: B

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28. If a+b, b+c and c+a are coterminous edges of a parallel opiped then its volume is

A. 3[a c b]

B. 0

C. 2[a b c]

D. 4[b a c]

Answer: C

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29. If the c.d.f (cumulative distribution function) is given by $F(x)=\frac{x-25}{10}$, then $P(27 \le x \le 33)= \dots$

A. $\frac{3}{5}$

B. $\frac{3}{10}$

C. $\frac{1}{5}$

D. $\frac{1}{10}$

Answer: A

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30. The joint equation of pair of straight lines passing through origin and having slopes $(1+\sqrt{2})$ and $\left(\frac{1}{1+\sqrt{2}}\right)$ is

A. $x^2 - 2\sqrt{2}xy + y^2 = 0$

B. $x^2 - 2\sqrt{2}xy - y^2 = 0$

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

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

Answer: A

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31. The angle between lines $\frac{x-2}{2}=\frac{y-3}{-2}=\frac{z-5}{1}$ and $\frac{x-2}{1}=\frac{y-3}{2}=\frac{z-5}{2}$ is ....

A. 30°

B. 60°

C. 45°

D. 90°

Answer: D

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32. If the line passes through the point P(6,-1,2), Q(8,-7,2λ) and R(5,2,4) then value of λ is ...

A. -3

B. 0

C. -1

D. 2

Answer: C

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33. The equivalent for of the statement $\sim(p \rightarrow \sim q)$ is

A. $p \wedge q$

B. $p \wedge \sim q$

C. $p \vee \sim q$

D. $\sim p \vee q$

Answer: A

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34. If $A = (x \in R : x^2 - 5|x| + 6 = 0\}$, then n(A)= . . .

A. 2

B. 0

C. 1

D. 4

Answer: D

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35. If the function $f(x) = \frac{\log(1 + ax) - \log(1 - bx)}{x}, x \neq 0$ is continuous at x=0 then, f(0)= . . .

A. loga-logb

B. a+b

C. loga+logb

D. a-b

Answer: B

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36. The co-ordinates of the foot of perpendicular drawn from origin to the plane 2x-y+5z-3=0 are

A. $\left(\frac{2}{\sqrt{30}}, \frac{-1}{\sqrt{30}}, \frac{5}{\sqrt{30}}\right)$

B. $(2, -1, 5)$

C. $\left(\frac{2}{3}, \frac{-1}{3}, \frac{5}{3}\right)$

D. $\left(\frac{1}{5}, \frac{-1}{10}, \frac{1}{2}\right)$

Answer: D

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37. $\int \frac{\sqrt{x^2 - a^2}}{x} dx$

A. $\sqrt{x^2 - a^2} - a \cos^{-1}\left(\frac{a}{x}\right) + c$

B. $x\sqrt{x^2 - a^2} - \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + c$

C. $\sqrt{x^2 - a^2} + a \sec^{-1}\left(\frac{x}{a}\right) + c$

D. $\sqrt{x^2 - a^2} + \frac{1}{x}\sec^{-1}(x) + c$

Answer: A

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38. The maximum value of z=9x+11y subject to 3x+2y $\leq 12, 2x + 3y \leq 12, x \geq 0, y \geq 0$ is

A. 44

B. 54

C. 36

D. 48

Answer: D

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39. $\int_0^4 \frac{1}{1+\sqrt{x}}dx = \ldots.$

A. $\log\left(\frac{e^4}{6}\right)$

B. $\log\left(\frac{e^4}{3}\right)$

C. $\log\left(\frac{e^4}{9}\right)$

D. $\log\left(\frac{e^3}{4}\right)$

Answer: C

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40. The number of solutions of $\sin^2\theta = \frac{1}{2}$ in $[0, \pi]$ is $\ldots$

A. three

B. four

C. two

D. one

Answer: C

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41. If p,q and r are non-zero, non-coplanar vectors then [p+q-r p-q q-r]= . . .

A. 3[p q r]

B. 0

C. [p q r]

D. 2[p q r]

Answer: C

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42. Which of the following equations has no solution?

A. $\sec\theta = 23$

B. $\cos\theta = \sqrt{2}$

C. $\tan\theta = \frac{1}{7}$

D. $\sin\theta = -\frac{1}{5}$

Answer: B

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43. The minimum value of $z = 10x + 25y$ subject to

A. $0 \leq x \leq 3, 0 \leq y \leq 3, x + y \geq 5$ is

B. 80

C. 95

D. 105

Answer: A

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44. If $f(x) = 3x^3 - 9x^2 - 27x + 15$,t hen the maximum value of $f(x)$ is

A. -66

B. 30

C. -30

D. 66

Answer: B

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45. Find the equation of the plane passing through the point $(-1, 2, 1)$ and perpendicular to the line joining the points $(-3, 1, 2) and (2, 3, 4)$. Find also the perpendicular distance of the origin from this plane.

A. $r \cdot \left(5\hat{i} + 2\hat{j} + 2\hat{k}\right) = 1$

B. $r \cdot \left(5\hat{i} + 2\hat{j} + 2\hat{k}\right) = -1$

C. $r \cdot \left(5\hat{i} - 2\hat{j} + 2\hat{k}\right) = -5$

D. $r \cdot \left(5\hat{i} - 2\hat{j} - 2\hat{k}\right) = 1$

Answer: A

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46. If the lengths of the transverse axis and the latusrectum of a hyperbola are 6 and $\frac{8}{3}$ respectively, then the equation of the hyperbola is ...

A. $4x^2 - 9y^2 = 72$

B. $4x^2 - 9y^2 = 36$

C. $9x^2 - 4y^2 = 72$

D. $9x^2 - 4y^2 = 36$

Answer: B

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47. Prove that $tan^{-1}\frac{1}{3} + tan^{-1}\frac{1}{5} + tan^{-1}\frac{1}{7} + tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

A. $\frac{11\pi}{5}$

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

C. π

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

Answer: B

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48. The joint equation of lines passing through the origin and trisecting the first quadrant is

A. $\sqrt{3}x^2 - 4xy + \sqrt{3}y^2 = 0$

B. $x^2 + \sqrt{3}xy - y^2 = 0$

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

D. $x^2 - \sqrt{3}xy - y^2 = 0$

Answer: A

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49. If $P(2, 2), Q(-2, 4)$ and $R(3, 4)$ are the vertices of ΔPQR then the equation of the median through vertex R is

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

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

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

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

Answer: B

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50. If $x=\sqrt{a^{\sin^{-1}t}}, y=\sqrt{a^{\cos^{-1}t}}$ then show that, $\frac{dy}{dx}=-\frac{y}{x}$.

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

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

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

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

Answer: A

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51. In a bionomial distribution, mean is 18 and variance is 12 then p= ....

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

B. $\frac{1}{3}$

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

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

Answer: B

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52. If lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-\lambda}{2}=\frac{z}{1}$ intersect each other, then $\lambda = \ldots$

A. $\frac{7}{2}$

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

C. $\frac{9}{2}$

D. $\frac{5}{2}$

Answer: C

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53. The particular solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x$, then x=0, y=1 is ...

A. $y = e^x + 2$

B. $y = -e^x$

C. $y = -e^x + 2$

D. $y = e^x$

Answer: D

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54. The p.d.f of a random variable x is given by $f(x) = \frac{1}{4a}, 0 < x < 4a, (a > 0)$

$= 0,$ otherwise

and $P\left(x < \frac{3a}{2}\right) = kP\left(x > \frac{5a}{2}\right.$ then k= ...

A. 1

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

C. $\frac{1}{8}$

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

Answer: A

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55. If the function $f(x)=\frac{(e^{kx}-1)\tan kx}{4x^2}, x\neq 0$

$=16 \qquad x=0$

is continuous at x=0, then k= . . .

A. $\pm\frac{1}{8}$

B. ± 4

C. ± 2

D. ± 8

Answer: D

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56. The solution of the differential equation $ydx - xdy = xydx$ is

A. $x^2 = e^x y^2$

B. $x = ye^x$

C. $xy = e^x$

D. $x^2 y^2 = \log x$.

Answer: B

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57. The maximum value of $z = 6x + 8y$ subject to $x - y \geq 0, x + 3y \leq 12, x \geq 0, y \geq 0$ is $\ldots$

A. 72

B. 42

C. 96

D. 24

Answer: A

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58. If $\sum_{n=1}^{n}(2r+1)=440$, then n= $\ldots$.

A. 20

B. 22

C. 21

D. 19

Answer: A

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59. If p and q are true and r and s are false statements, then which of the following is true?

A. $(q \wedge r) \vee (\sim p \wedge s)$

B. $(\sim p \rightarrow q) \leftrightarrow (r \wedge s)$

C. $(p \rightarrow q) \vee (r \leftarrow s)$

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

Answer: C

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60. If the standard deviation of the random variable X is $\sqrt{3pq}$ and mean is 3p then $E(x^2)$= . . .

A. 3pq+$3q^2$

B. $3p(1+2p)$

C. $3pq + 3p^2$

D. $3p(1 + 2q)$

Answer: B

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61. If $f(x) = [x]$, where [x] is the greatest integer not greater than x, then f'(1^+)= . . .

A. 1

B. 2

C. 0

D. -1

Answer: C

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62. If lines represented by $(1+\sin^2\theta)x^2 + 2hxy + 2\sin\theta y^2 = 0, \theta \in [0, 2\pi]$ are perpedicular to each other then $\theta = \ldots.$

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

B. π

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

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

Answer: C

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63. If $A = \{x \mid x \in N, x$ is a prime number less than 12} and $B\{x \mid x \in N, x$is a factor of 10}, then $A \cap B = \ldots$

A. {2}

B. {2,5}

C. {2,5,10}

D. {1,2,5,10}

Answer: B

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64. If R is the circum radius of ΔABC, then A (ΔABC)= ...

A. $\frac{abc}{R}$

B. $\frac{abc}{4R}$

C. $\frac{abc}{3R}$

D. $\frac{abc}{2R}$

Answer: B

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65. If A,B,C and D are {3,7,4),(5,-2,-3),(-4,5,6) and (1,2,3) respectively, then the volume of the parallelopiped with AB, AC and AD as the co-terminus edges, is . . . Cubic units.

A. 91

B. 94

C. 92

D. 93

Answer: C

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66. If $\left(-\sqrt{2}, \sqrt{2}\right)$ are cartesian co-ordinates off the point, then its polar co-ordinates are . . .

A. $\left(1, \frac{4\pi}{3}\right)$

B. $\left(2, \frac{3\pi}{4}\right)$

C. $\left(3, \frac{7\pi}{4}\right)$

D. $\left(4, \frac{5\pi}{4}\right)$

Answer: B

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67. If $\int \frac{\cos x - \sin x}{8 - \sin 2x} dx = \frac{1}{p} \log\left[\frac{3 + \sin x + \cos x}{3 - \sin x - \cos x}\right] + c$, then p= ....

A. 6

B. 1

C. 3

D. 12

Answer: A

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68. If A is non-singular matrix and $(A+I)(A-I)=0$ then $A+A^{-1}= \ldots$

A. 2A

B. 0

C. I

D. $3I$

Answer: A

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69. Equations of planes parallel to the plane $x-2y+2z+4=0$ which are at a distance of one unit from the point (1,2,3) are ...

A. x+2y+2z=-6,x+2y+2z=5

B. x-2y-6=0,x-2y+z=6

C. x+2y+2z=6,x+2y+2z=0

D. x-2y+2z=0,x-2y+2z-6=0

Answer: D

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70. The y-intercept of the line passing through A(6,1) and perpendicular to the line x-2y=4 is . . .

A. 5

B. 13

C. -2

D. 26

Answer: B

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71. If function

$$f(x) = x - \frac{|x|}{x}, x < 0$$
$$= x + \frac{|x|}{x}, x > 0$$
$= 1, x = 0$, then

A. $\lim_{x \to 0^-} f(x)$ does not exist

B. f(x) is continuous at x=0

C. $\lim_{x \to 0^-} f(x) \neq \lim_{x \to 0^+} f(x)$

D.

Answer: C

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72. In $\Delta ABC,$ if tanA+tanB+tanC=6 and tanA.tanB=2` then tanC= . .

A. 3

B. 4

C. 1

D. 2

Answer: A

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73. If P(6,10,10),Q(1,0,-5),R(6,-10,λ) are vertices of a triangle right angled at Q, then value of λ is . .

A. 0

B. 1

C. 3

D. 2

Answer: A

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74. For L.P.P, maximize $z = 4x_1 + 2x_2$ subject to

A. $3x_1 + 2x_2 \geq 9$, $x_1 - x_2 \leq 3$, $x_1 \geq 0$, $x_2 \geq 0$ has ...

B. infinite number of optimal solutions

C. unbounded solution

D. no solution

Answer: B

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75. The function $f(x) = x^3 - 3x$ is

A. increasing in $(-\infty, -1) \cup (1, \infty)$ and decreasin in $(-1, 1)$

B. increasing in $(0, \infty)$ and decreasingg in $(-\infty, 0)$

C. decreasing in $(0, \infty)$ and increasing in $(-\infty, 0)$

D. decreasing in $(-\infty, -1) \cup (1, \infty)$ and increasingg in (-1,1)

Answer: A

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76. If $x = \sin\theta, y = \sin^3\theta$ then $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$ is ...

A. 3

B. 6

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

D. $\frac{1}{3}$

Answer: B

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77. The area of the region enclosed between pair of the lines xy=0 and the lines xy+5x-4y-20=0, is

A. 20 square units

B. $\frac{4}{5}$ square units

C. 10 square units

D. 6 square units

Answer: A

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78. If three dices are thrown then the probability that the sum of the numbers on their uppoermost faces to be atleast 5 is

A. $\frac{1}{53}$

B. $\frac{53}{54}$

C. $\frac{1}{54}$

D. $\frac{52}{53}$

Answer: B

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79. If $f(x) = 3x + 6, g(x) = 4x + k$ and $fog(x) = gof(x)$ then k= . .

A. -9

B. 18

C. $1/9$

D. 9

Answer: D

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80. If the sum of an infinite GP be 9 and sum of first two terms be 5 them their common ratio is . . .

A. $\frac{1}{3}$

B. 3

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

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

Answer: C

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81. the negation of $\forall, n \in N, n+7>6$ is $\ldots$

A. $\exists n \in N,$ such that $n+7 \leq 6$

B. $\exists n \in N,$ such that $n+7 \geq 6$

C. $\forall n \in N, n+7 \leq 6$

D. $\exists n \in N,$ such that n+7 <6

Answer: A

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82. If the vectors $x\hat{i} - 3\hat{j} + 7\hat{k}$ and $\hat{i} + y\hat{j} - z\hat{k}$ are collinear then the value of $\frac{xy^2}{z}$ is equal

A. $\frac{9}{7}$

B. $\frac{-9}{7}$

C. $\frac{-7}{9}$

D. $\frac{7}{9}$

Answer: B

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83. If

$$\int \tan(x-\alpha)\tan(x+\alpha)\cdot\tan 2x dx = p\log|\sec 2x| + q\log|\sec(x+\alpha)| + r$$

then p+q+r= . . ..

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

B. $\frac{-5}{2}$

C. $\frac{5}{2}$

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

Answer: A

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84. Using differentiation, approximate value of $f(x) = x^2 - 2x + 1$ at x=2.99 is . . .

A. 3.96

B. 9.96

C. 4.98

D. 5.98

Answer: A

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85. A particle moves so that x=2+27t-t^3. The direction of motion reverses after moving a distance of . . . Units.

A. 80

B. 56

C. 60

D. 65

Answer: B

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86. Which of the following is not equal to $w \cdot (u \times v)$?

A. $u \cdot (v \times w)$

B. $v \cdot (w \times u)$

C. $(u \times v) \cdot w$

D. $v \cdot (u \times w)$

Answer: D

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87. The value of $\sin 18^{\circ}$ is

A. $\frac{\sqrt{5}+1}{4}$

B. $\frac{\sqrt{5}-1}{4}$

C. $\frac{4}{\sqrt{5}+1}$

D. $\frac{4}{\sqrt{5}-1}$

Answer: B

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88. If the foot of the perpendicular drawn from the point (0,0,0) to the plane is (4,-2,-5) then the equation of the plane is . . .

A. 4x+2y+5z=-13

B. 4x-2y-5z=45

C. 4x+2y-5z=37

D. 4x-2y+5z=-5

Answer: B

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89. $\int \frac{x^2+1}{x^4-x^2+1} dx = \ldots$

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

B. $\tan^{-1}(x^2)+c$

C. $\tan^{-1}(2x^2-1)+c$

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

Answer: D

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90. If $x^y = e^{x-y}$; then $\frac{dy}{dx}$ is

A. e

B. 1

C. 0

D. -1

Answer: C

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91. If $A = \begin{bmatrix} 1+2i & i \\ -I & 1-2i \end{bmatrix}$, where $i = \sqrt{-1}$, then $A(adjA) = \ldots$

A. $-2l$

B. $2l$

C. $5l$

D. $4l$

Answer: D

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92. Which of the following statements is contingency?

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

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

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

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

Answer: C

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93. $\int_a^b \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a+b-x}} dx = \dots$

A. $a+b$

B. $\frac{b-a}{2}$

C. a-b

D. $\frac{a-b}{2}$

Answer: B

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94. The intercept on line $y=x$ by circle $x^2+y^2-2x=0$ is AB. Find equation of circle with AB as a diameter.

A. $x^2+y^2+x+y=0$

B. $x^2+y^2-x-y=0$

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

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

Answer: B

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95. Find the equation of the circle passing through $(-2, 14)$ and concentric with the circle $x^2 + y^2 - 6x - 4y - 12 = 0$.

A. $x^2 + y^2 - 6x - 4y + 4 = 0$

B. $x^2 + y^2 - 6x - 4y + 9 = 0$

C. $x^2 + y^2 - 6x - 4y - 4 = 0$

D. $x^2 + y^2 - 6x - 4y - 9 = 0$

Answer: A

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96. Evaluate : $\int_0^1 x(1-x)^5 dx$

A. $\frac{1}{5}$

B. $\frac{1}{42}$

C. $\frac{1}{13}$

D. $\frac{13}{42}$

Answer: B

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97. If $4\sin^{-1}x+6\cos^{-1}x=3\pi$ then x= $\dots$

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

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

C. 0

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

Answer: C

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98. If $\int_0^a \sqrt{\frac{a-x}{x}}dx = \frac{K}{2}$, then K=...

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

B. $\frac{5\pi a}{2}$

C. $\frac{3\pi a}{2}$

D. πa

Answer: D

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99. In ΔABC, with usual notations, $\frac{b\sin B - c\sin C}{\sin(B-C)} = \dots$

A. b

B. a+b+c

C. a

D. c

Answer: C

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100. The solution of the differential equation $\frac{d\theta}{dt} = -k(\theta - \theta_0)$ where k is constant, is ....

A. $\theta = \theta_0 + ae^{-kt}$

B. $\theta = \theta_0 + ae^{kt}$

C. $\theta = 2\theta_0 - ae^{kt}$

D. $\theta = 2\theta_0 - ae^{-kt}$

Answer: A

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101. The vector equation of the plane $r = \left(2\hat{i} + \hat{k}\right) + \lambda\left(\hat{i}\right) + \mu\left(\hat{i} + 2\hat{j} - 3\hat{k}\right)$ in scalar product formm is

$r \cdot \left(3\hat{i} + 2\hat{k}\right) = \alpha$, then α= . . .

A. 2

B. 3

C. 1

D. 0

Answer: A

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102. Area of the region bounded by $y = \cos x$, $x = 0$, $x = \pi$ and X-axis is . . .sq. units.

A. 3

B. 1

C. 2

D. 4

Answer: C

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103. The length of the latusrectum of an ellipse is $\frac{18}{5}$ and eccentricity is $\frac{4}{5}$, then equation of the ellipse is . .

A. $\frac{x^2}{25}+\frac{y^2}{8}=1$

B. $\frac{x^2}{25}+\frac{y^2}{9}=1$

C. $\frac{x^2}{25}+\frac{y^2}{16}=1$

D. $\frac{x^2}{16}+\frac{y^2}{9}=1$

Answer: B

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104. Let $a: \sim(p \wedge \sim r) \vee (\sim q \vee s)$ and $b: (p \vee s) lar (q \wedge r)$. If the truth values of p and q are true and that of r and s are false, then the truth values of a and b are respectively . . .

A. F,F

B. T,T

C. T,F

D. F,T

Answer: A

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105. "If two triangles are congruent, then their areas are equal" is the given statement then the contrapositive of, the inverse of the given statement is

A. if areas of two triangles are not equal then they are congruent

B. if two triangles are not congruent then their areas are equal to

C. If two triangles are not congruent then their areas are not equal

D. If areas of two triangles are equal then they are congruent

Answer: D

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106. $\int \log x \cdot [\log(ex)]^{-2} dx = \dots$

A. $\frac{x}{1 + \log x} + c$

B. $x(1 - \log x) + c$

C. $x(1 + \log x) + c$

D. $\frac{x}{1 - \log x} + c$

Answer: A

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107. $y = \log\left[\frac{x + \sqrt{x^2 + 25}}{\sqrt{x^2 + 25} - x}\right], find \frac{dy}{dx}$

A. $\dfrac{1}{\sqrt{x^2+25}}$

B. $\dfrac{2}{\sqrt{x^2+25}}$

C. $\dfrac{-1}{\sqrt{x^2+25}}$

D. $\dfrac{-2}{\sqrt{x^2+25}}$

Answer: B

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108. If the scalar triple product of the vectors $-3\hat{i}+7\hat{j}-3\hat{k}, 3\hat{i}-7\hat{j}+\lambda\hat{k}$ and $7\hat{i}-5\hat{j}-3\hat{k}$ is 272 then λ= . . .

A. 9

B. 11

C. 8

D. 10

Answer: B

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109. The edge of a cube is decreasingg at the rate of 0.04 cm/sec. if the edge of the cube is 10 cms, then rate of decrease of surface area of the cube is . . .

A. $4.8cm^2/\sec$

B. $4.08cm^2/\sec$

C. $48cm^2/\sec$

D. $4.008cm^2/\sec$

Answer: A

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110. The joint equation of lines passing through origin and having slopes $(1+\sqrt{2})$ and $\frac{-1}{1+\sqrt{2}}$ is

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

B. $x^2 - 2\sqrt{2}xy - y^2 = 0$

C. $x^2 - 2\sqrt{2}xy + y^2 = 0$

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

Answer: A

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111. If r is the radius of spherical balloon at time t and the surface area of balloon changes at a constant rate K, then . . ..

A. $4\pi r^2 = \frac{Kt^2}{2} + c$

B. $8\pi r^2 = Kt + c$

C. $\pi r^2 = \frac{Kt^2}{2} + c$

D. $4\pi r^2 = Kt + c$

Answer: D

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112. $\int_0^{\frac{\pi}{2}} \sqrt{\cos\theta} \cdot \sin^3\theta d\theta = \ldots$

A. $\frac{-20}{21}$

B. $\frac{-8}{21}$

C. $\frac{20}{21}$

D. $\frac{8}{21}$

Answer: D

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113. If ω is a complex cube root of unit and

$A = \begin{bmatrix} \omega & 0 & 0 \\ 0 & \omega^2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^{-1} = \ldots$

A. $\begin{bmatrix} \omega^2 & 0 & 0 \\ 0 & \omega & 0 \\ 0 & 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & \omega^2 & 0 \\ 0 & 0 & \omega \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 & \omega \\ 0 & \omega^2 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

Answer: A

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114. If A and B are squuare matrices of order 3 such that $|A| = 2, |B| = 4, ,$ then $|A(adjB)| = \ldots$

A. 16

B. 8

C. 64

D. 32

Answer: D

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115. If $\int \frac{1}{1 - \cot x} dx = Ax + B \log|\sin x - \cos x| + c$ then $A + B = \,..$
.

A. 1

B. -1

C. 0

D. -2

Answer: A

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116. The polar co-ordinates of P are $\left(2, \frac{\pi}{6}\right)$. If Q is the image of P about the X-axis then the polar co-ordinates of Q are . . . .

A. $\left(2, \frac{5\pi}{6}\right)$

B. $\left(2, \frac{\pi}{6}\right)$

C. $\left(2, \frac{\pi}{3}\right)$

D. $\left(2, \frac{11\pi}{6}\right)$

Answer: D

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117. a and b are non-collinear vectors. If $c = (x-2)a + b$ and $d = (2x+1)a - b$ are collinear vectors, then the value of x= ...

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

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

C. $\frac{1}{5}$

D. $\frac{1}{3}$

Answer: D

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118. Let X be the number of successes in 'n' independent Bernoulli trials with probability of success $p = \frac{3}{4}$, the least value of 'n' so that $P(x \geq 1) \geq 0.9375$ is

A. 2

B. 1

C. 4

D. 3

Answer: A

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119. The slopee of normal to the curve $x = \sqrt{t}$ and $y = t - \frac{1}{\sqrt{t}}$ at t=4 is

...

A. $\frac{-17}{4}$

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

C. $\frac{-4}{17}$

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

Answer: C

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120. Which of the following statement patternn is a tautology?

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

B. $p \to (q \vee p)$

C. $(p \vee q) \to q$

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

Answer: B

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121. The acute angle between lines x-3=0 and x+y=19 is . . .

A. 60°

B. 30°

C. 90°

D. 45°

Answer: D

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122. In ΔABC, with the usual notations, if $\left(\tan\frac{A}{2}\right)\left(\tan\frac{B}{2}\right)=\frac{3}{4}$ then a+b= . . .

A. 4c

B. 2c

C. 7c

D. 3c

Answer: C

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123. If sum of the slopes of the lines given by $x^2 - pxy + 8y^2 = 0$ is three times their product then p= . . .

A. $\frac{3}{4}$

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

C. 4

D. 3

Answer: A

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124. $\frac{1-2[\cos 60^{\circ} - \cos 80^{\circ}]}{2\sin 10^{\circ}} = ..$

A. 2

B. 1

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

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

Answer: B

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125. The differential equation of all circles in the first quadrant which touch the coordiante axes is of order

A. two

B. three

C. one

D. four

Answer: C

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126. If f(x) is continuous at x=3, then $f(x) = ax + 1, \quad \text{for x} \quad \leq 3$

$= bx + 3, \quad \text{for x} \quad > \quad 3$ then

A. $a + b = \frac{-2}{3}$

B. $a - b = \frac{-2}{3}$

C. $a - b = \frac{2}{3}$

D. $a + b = \frac{2}{3}$

Answer: C

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127. The probability that three cards drawn from a pack of 52 cards, all are red is

A. $\frac{1}{17}$

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

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

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

Answer: D

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128. For any non zero vector, a,b,c

$a \cdot [(b+c) \times (a+b+c)] = \ldots.$

A. 0

B. 2[a b c]

C. [a b c]

D. [a c b]

Answer: A

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129. The domain of the real valued function $f(x)=\sqrt{\frac{x-2}{3-x}}$ is . .

A. (2,3]

B. [2,3)

C. (2,3)

D. [2,3]

Answer: B

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130. If $y=\tan^{-1}\left(\frac{1-\cos 3x}{\sin 3x}\right)$, then $\frac{dy}{dx}=\ldots$

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

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

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

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

Answer: C

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131. If $z = ax + by, a, b, > 0$ subject to $x \leq 2, y \leq 2, x + y \geq 3, x \geq 0, y \geq 0$ has minimum value at (2,1) only, then . .

A. $a > b$

B. $a = b$

C. $a < b$

D. $a = 1 + b$

Answer: C

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132. The direction ratios of the normal to the plane passing through origin and the line of intersection of the planes $x+2y+3z=4$ and $4x+3y+2z=1$ are . . .

A. 2,3,1

B. 1,2,3

C. 3,1,2

D. 3,2,1

Answer: D

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133. The pdf of a random variable X is

$f(x) = 3(1 - 2x^2), 0 < x < 1$

$= 0 \qquad \text{otherwise}$

The $P\left(\frac{1}{4} < X < \frac{1}{3}\right) = \dots$

A. $\frac{179}{864}$

B. $\frac{159}{864}$

C. $\frac{169}{864}$

D. $\frac{189}{864}$

Answer: A

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134. The eccentricity of the hyperbola $25x^2 - 9y^2 = 225$ is ...

A. $\frac{\sqrt{34}}{3}$

B. 4

C. $\sqrt{34}$

D. $\frac{\sqrt{34}}{5}$

Answer: A

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135. If $f(x) = x + \frac{1}{x}, x \neq 0$, then local maximum and minimum values of function f are respectively . . .

A. $-1 \text{ and } 1$

B. $-2 \text{ and } 2$

C. $2 \text{ and } -2$

D. $1 \text{ and } -1$

Answer: B

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136. Derivative of $\sin^{-1}\left(\frac{t}{\sqrt{1+t^2}}\right)$ with respect to $\cos^{-1}\left(\frac{1}{\sqrt{1+t^2}}\right)$ is

A. 1

B. $\cot \quad t$

C. $\tan \quad t$

D. 0

Answer: A

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137. A player tosses 2 fair coins. He wins Rs. 5 if 2 heads appear, Rs. 2 if 1 head appear and Rs. 1 if no head appears, then variance of his winning amount is

A. 6

B. $\frac{5}{2}$

C. $\frac{9}{4}$

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

Answer: C

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138. In ΔABC, with the usual notations, if $\sin B \sin C = \frac{bc}{a^2}$, then the triangle is

A. Right angled triangle

B. Obtuse angled triangle

C. Equilateral triangle

D. Acute angled triangle

Answer: A

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139. If $A=\{x\in R/x^2+5|x|+6=0\}$ then n(A)= ...

A. 0

B. 4

C. 1

D. 2

Answer: A

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140. $\int\frac{dx}{(\sin x+\cos x)(2\cos x+\sin x)}=$

A. $\log|\sin x+\cos x|+c$

B. $\log\left|\frac{\tan x+2}{\tan x+1}\right|+c$

C. $\log\left|\frac{\sin x+\cos x}{2\cos x-\sin x}\right|+c$

D. $\log\left|\frac{\tan x+1}{\tan x+2}\right|+c$

Answer: D

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141. The solution of the differential equation

$\left(1+x^2\right)\frac{dy}{dx}+1+y^2=0$, is

A. $x+y=c$

B. $\left(x^2+1\right)\left(y^2+1\right)=c$

C. $x^2=y^2+c$

D. $\tan^{-1}x+\tan^{-1}y=c$

Answer: D

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142. $\sin\left[3\sin^{-1}(0.4)\right]=\ \dots$

A. 0.466

B. 0.256

C. 0.944

D. 0.764

Answer: C

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143. If line $\frac{2x-4}{\lambda}=\frac{\lambda-1}{2}=\frac{z-3}{1}$ and $\frac{x-1}{1}=\frac{3y-1}{\lambda}=\frac{z-2}{1}$ are perpendicular to each then $\lambda=\ \ldots$

A. 7

B. $-\frac{7}{6}$

C. 6

D. $-\frac{6}{7}$

Answer: D

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144. For sequence (t_n), if $S_n = 5(2^n - 1)$ then $t_n = \ldots$

A. $5(2^{n+1})$

B. $\frac{5 \times 2^n}{4}$

C. $5(2^{n-1})$

D. $\frac{2(2^{n-1})}{5}$

Answer: C

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145. If $f(x) = \left[\tan\left(\frac{\pi}{4} + x\right)\right]^{\frac{1}{x}}, x \neq 0$ $f(x) = k, x = 0,$ is continuous at x=0 Then k= ....

A. e^2

B. 1

C. e

D. e^{-2}

Answer: A

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146. Which of the following fucntion has period 2?

A. $\cos\left[\left(\frac{\pi}{4}\right)x\right]$

B. $\cos\left[\left(\frac{\pi}{2}\right)x\right]$

C. $\cos(2\pi x)$

D. $\cos(\pi x)$

Answer: D

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147. Which of the following can not be the direction cisines of a line?

A. $\sqrt{\frac{1}{5}}, -\sqrt{\frac{1}{2}}, \sqrt{\frac{3}{10}}$

B. $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

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

D. $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, 0$

Answer: C

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148. If the p^{th}, q^{th} and r^{th} terms of a G.P are a,b,c respectively then the value of $a^{q-r}. b^{r-p}. c^{p-q} =$

A. 0

B. 1

C. 3

D. -1

Answer: B

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149. $\int_{\frac{\pi}{18}}^{\frac{4\pi}{9}} \frac{2\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx = \ldots$

A. $\frac{7\pi}{36}$

B. $\frac{5\pi}{36}$

C. $\frac{7\pi}{18}$

D. $\frac{5\pi}{18}$

Answer: C

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150. The maximum value of $Z = 5x + 4y$, subject to $y \leq 2x, x \leq 2y, x + y \leq 3, x \geq 0, y \geq 0$ is ...

A. 14

B. 12

C. 13

D. 18

Answer: A

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