



MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 10

Paper 2 Mathematics

1. If
$$A = \begin{bmatrix} \cos^2 \theta & \cos \theta \sin \theta \\ \cos \theta \sin \theta & \sin^2 \theta \end{bmatrix}$$
 B=
 $\begin{bmatrix} \cos^2 \phi & \cos \phi \sin \phi \\ \cos \phi \sin \phi & \sin^2 \phi \end{bmatrix}$ and

$$heta-\phi=(2n+1)rac{\pi}{2}$$
 Find AB.

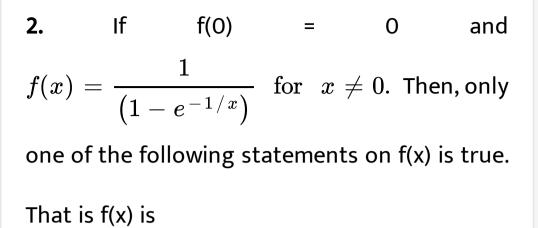
A.
$$heta=n\phi, n=0,1,2,\ldots$$
 .

B.
$$heta+\phi=n\pi, n=0,1,2\dots$$

C.
$$heta=\phi+(2n+1)rac{\pi}{2}, n=0,1,2 \dots$$

D.
$$heta=\phi+nrac{\pi}{2}, n=0,1,2,\ \dots$$

Answer: C



A. continuous at x=0

B. not continuous at x=0

C. both continuous and differentiable at

x=0

D. not defined at x=0

Answer: B



3. if statements p and r are false and q is true, then trueth value of ${\sim}\pi mplies(q \wedge r) \lor r$ is

A. T

B.F

C. Either T or F

D. Neither T nor F

Answer: B



- **4.** Let p and q be two statements, then $(p \wedge q) \lor \sc p$ is
 - A. tautology
 - B. contradiction
 - C. both (a) and (b)
 - D. none of the above

Answer: A

5. If
$$\int \sqrt{2} ig(\sqrt{1+\sin x} dx = 4\cos(ax+b) + c$$
,

then the value of a,b are

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

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

C. 1,1`

D. none of these

Answer: A

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6.
$$\int_{-1}^{1} \log \left(x + \sqrt{x^2 + 1} \right) dx = ?$$

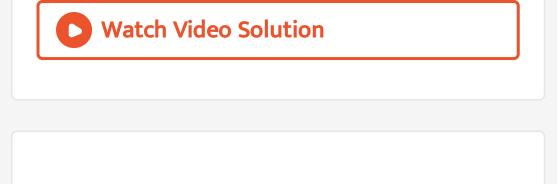
A. 0

B. log 2

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

D. none of these

Answer: A



7. Area lying between parabola $y^2=4ax$ and

it's latuscrectum is

A.
$$\frac{4}{3}a^2$$
 sq unit
B. $\frac{16}{3}a^2$ sq unit
C. $\frac{8}{3}a^2$ sp unit

D. None of these

Answer: C





8. Solution of y
$$dx - xdy = x^2ydx$$
 is

A.
$$\displaystyle rac{y}{x} + e^x = c$$

$$\mathsf{B}.\,\frac{x}{y}+e^x=c$$

$$\mathsf{C}.\, x + e^y = c$$

D.
$$y + e^x = c$$

Answer: A

9. The second order derivative of $a\sin^3 t$ w.r.t,

$$a\cos^3 t$$
 at $t=rac{\pi}{4}$ is

A.
$$\frac{4\sqrt{2}}{3a}$$

$$\mathsf{B.}\,2$$

$$\mathsf{C.}\,\frac{1}{12a}$$

D. None of these

Answer: A

10. The equation of the plane passing through

the points (1,2,3), (-1,4,2) and (3,1,1) is

B. 5x+6y+2z-23=0

C. x + 6y + 2z - 13 = 0

D.
$$x+y+z-13=0$$

Answer: B

11. To maximise the objective function

$$z = x + 2y$$
 under the constraints
 $x - y \le 2, x + y \le 4$ and $x, y \ge 0$ is
A. 1x=0,y=4,z=8`
B. $x = 1, y = 2, z = 5$
C. $x = 1, y = 4, z = 9$
D. $x = 0, y = 3, z = 6$

Answer: A

12. If
$$rac{\sin(x+y)}{\sin(x-y)} = rac{a+b}{a-b}$$
 , then show that $rac{ an x}{ an y} = rac{a}{b}.$

A.
$$\frac{a^2}{b^2}$$

B. $\frac{a}{b}$
C. $\frac{b}{a}$
D. $\frac{a^2 + b^2}{a^2 - b^2}$

Answer: B

13. If the equation $\lambda x^2 + (2\lambda - 3)y^2 - 4x - 1 = 0$ represents a

circle, then its radius is

A.
$$\frac{\sqrt{11}}{3}$$

B.
$$\frac{\sqrt{13}}{3}$$

C.
$$\frac{\sqrt{7}}{3}$$

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

Answer: C



14. If the lines joining the origin to the points of intersection of the line y = mx + 2 and the curve $x^2 + y^2 = 1$ are at right-angles, then

A.
$$m=\sqrt{3}$$

B.
$$m=~\pm\sqrt{7}$$

$$\mathsf{C}.\,m=1$$

D.
$$m=\sqrt{5}$$

Answer: B

15. The distance between the foci of the conic $7x^2 - 9y^2 = 63$ is equal to

A. 8

- B.4
- C. 3
- D. 7

Answer: A



16. The line lx + my + n = 0 is a normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. then prove that $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

A. n

 $\mathsf{B}.\,n^2$

 $\mathsf{C}.\,n^3$

D. None of these

Answer: B

17. The angle of intersection of the curves $y = x^2$ and $x = y^2$ at (1,1) is

A.
$$\tan^{-1}\left(\frac{4}{3}\right)$$

$$\mathsf{B}. an^{-1}(1)$$

$$\mathsf{C.90}^\circ$$

$$\mathsf{D}. an^{-1}\left(rac{3}{4}
ight)$$

Answer: D



18. A straight line passing through the point (2, 2) and the axes enclose an area λ . The intercepts on the axes made by the line are given by the two roots of:

(A) $x^2-2|\lambda|x+|\lambda|=0$ (B) $x^2+|\lambda|x+2|\lambda|=0$ (C) $x^2-|\lambda|x+|2\lambda|=0$ (D) None of these

A.
$$x^{2_{-2}\lambda x + \lambda = 0}$$

B.
$$x^2 + \lambda x + 2\lambda = 0$$

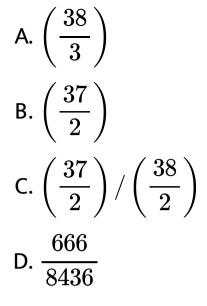
C. $x^2 - \lambda x + 2\lambda = 0$

D. None of these

Answer: C



19. If a committee of 3 is to be chosen from a group of 38 people of which you are a member. What is the probability that you will be on the committee?



Answer: D



20. The real number x when added to its inverse given the minimum value of the sum at x equal to 1 (b) -1 (c) -2 (d) 2

 $\mathsf{A.}-2$

 $\mathsf{B.}\,2$

C. 1

D. -1

Answer: C

21. The value of
$$\displaystyle rac{e^{3x-6}-1}{\sin(2-x)}$$

B. 3

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

C.-3

D. -1

Answer: C

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22. If $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$, then f(x) is

A. increasing in $(-\infty, 2)$ and in (0,1)

B. increasing in (-2,0) and in $(1,\infty)$

C. decreasing in (-2, 0) and in (0,1)

D. decreasing in $(-\infty, -2)$ and in (1, ∞)

Answer: B

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23. In which of the following functions, Rolle's

theorem is applicable?

A.
$$f(x) = |x|$$
 in $-2 \leq x \leq 2$

B. f(x) = an x in $0 \le x \le \pi$

C.
$$f(x)=1+(x-2)^{rac{2}{3}}$$
 in $1\leq x\leq 3$

D. $f(x) = x(x-2)^2$ in $0 \le x \le 2$

Answer: D

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24. An edge of a variable cube is increasing at

the rate of 10cm/sec. How fast the volume of

the cube is increasing when the edge is 5cm

long?

A. 750
$$cm^2/s$$

B. 75 cm^3/s

C. 300 cm^3/s

D. 150 cm^3/s

Answer: A



25. The general solution of

$$y^2dx+ig(x^2-xy+y^2ig)dy=0$$
, is

A.
$$\tan^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$$

B. $2\tan^{-1}\left(\frac{x}{y}\right) + \log x + c = 0$
C. $\log\left(y + \sqrt{x^2} + y^2\right) + \log y + c = 0$
D. $\sinh^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$

Answer: A

26.
$$\cos\left\{\cos^{-1}\left(-\frac{1}{7}\right) + \sin^{-12}\left(-\frac{1}{7}\right)\right\} =$$

A. $-\frac{1}{3}$
B. 0
C. $\frac{1}{3}$
D. $\frac{4}{9}$
Answer: B

27. In any triangle ABC, if

a = 18, b = 24, c = 30, findsinA, sinB, sinC

A. 43835

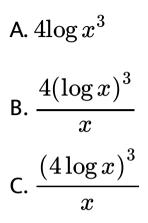
B. 43895

C. 43866

D. None of these

Answer: B

28.
$$\frac{d}{dx}(\log x)^4$$
 is equal to



D.

Answer: C



29. The set of points where the function f9x) = x|x| is differentiable is $(-\infty, \infty)$ (b) $(-\infty, 0) \cup (0, \infty)$ $(0, \infty)$ (d) $[0, \infty)$

A.
$$(\,-\infty,\infty)$$

B.
$$(\,-\infty,0)\cup(0,\infty)$$

$$\mathsf{C}.\left(0,\infty
ight)$$

D. $[0,\infty)$

Answer: A

30. The value of
$$lpha,$$
 which satisfy $\int_{rac{\pi}{2}}^{lpha}\sin x dx = \sin 2lpha (lpha \in [0,2\pi]$ are equal

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

B. $\frac{3\pi}{2}$
C. $\frac{7\pi}{6}$

D. all of these

Answer: D



31. For a party 7 guests are invited by a husband and his wife. They sit in a row for dinner. The probability that the husband and his wife sit together, is

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

B. $\frac{2}{9}$
C. $\frac{1}{9}$
D. $\frac{4}{9}$

Answer: B



32. Find the area of the closed figure bounded

by the curves $y=\sqrt{x}, y=\sqrt{4-3x} and y=0$

A. 4/9

B. 44052

C. 16/9

D. none of these

Answer: B

$$\begin{aligned} \textbf{33.} & \int \frac{dx}{x\sqrt{x^6 - 16}} = \\ & \textbf{A.} \, \frac{1}{3} \sec^{-1} \left(\frac{x^3}{4} \right) + c \\ & \textbf{B.} \cos^{-1} \left(\frac{x^3}{4} \right) + c \\ & \textbf{C.} \, \frac{1}{12} \sec^{-1} \left(\frac{x^3}{4} \right) + c \\ & \textbf{D.} \sec^{-1} \left(\frac{x^3}{4} \right) + c \end{aligned}$$

Answer: C



34. The locus of the point which divides the double ordinates of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in the ratio 1:2 internally is $\frac{x^2}{a^2} + \frac{9y^2}{b^2} = 1$ (b) $\frac{x^2}{a^2} + \frac{9y^2}{b^2} = \frac{1}{9} + \frac{9x^2}{a^2} + \frac{9y^2}{b^2} = 1$ (d)

none of these

A.
$$rac{x^2}{a^2}-rac{9y^2}{b^2}=rac{1}{9}$$

B. $rac{x^2}{a^2}+rac{9y^2}{b^2}=1$
C. $rac{9x^2}{a^2}+rac{9y^2}{b^2}=1$

D. None of these

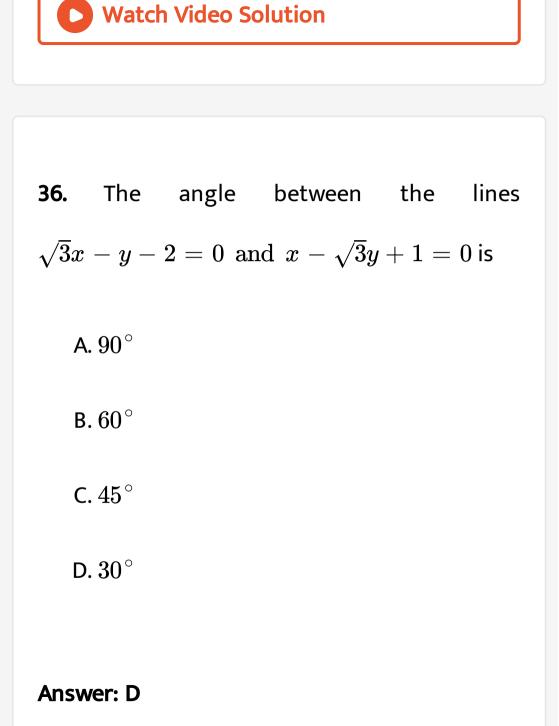
Answer: B



35. Determine the ratio in which the line 3x + y - 9 = 0 divides the segment joining the points (1,3) and (2,7).

- A. 3:4 externally
- B. 3:4 internally
- C. 4:5 internally
- D. 5:6 externally

Answer: B





37. The bisector of the acute angle formed between the lines 4x - 3y + 7 = 0 and 3x - 4y + 14 = 0 has the equation

A. x+y+3=0

B. x-y-3=0

C. x-y+3=0

D. 3x+y-7=0

Answer: C





38. The value of $i^2 + i^4 + i^6 + i^8$ upto (2n+1) terms , where i^2 = -1, is equal to:

A. 0

B. 1

 $\mathsf{C}.-1$

D. k

Answer: C

39. The coordinate of the point of intersection

of the line $\displaystyle rac{x-1}{1} = \displaystyle rac{y+2}{3} = \displaystyle rac{z-2}{-2}$ with the plane

A. (5,10,6)

B. (10,5,6)

C. (5,5,-6)

D. (5,10,-6)

Answer: D

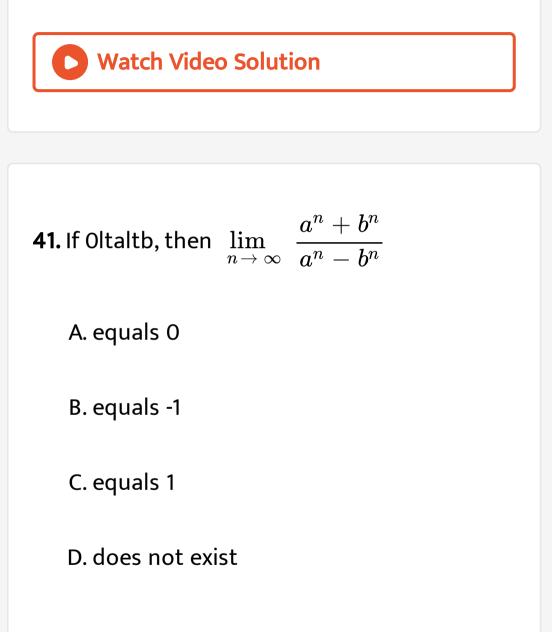


40. The acute angle between the line joining the points (2,1,-3) and (-3,1,7)and a line parallel to $\frac{x-1}{3} = \frac{y}{4} = \frac{z+3}{5}$ through the point (-1,0,4) is

A.
$$\cos^{-1}\left(\frac{1}{\sqrt{10}}\right)$$

B. $\cos^{-1}\left(\frac{1}{5\sqrt{10}}\right)$
C. $\cos^{-1}\left(\frac{7}{5\sqrt{10}}\right)$
D. $\cos^{-1}\left(\frac{3}{5\sqrt{10}}\right)$

Answer: C



Answer: B



42. if $\tan(k+1)\theta = \tan \theta$, then θ belongs to the set

- A. $\{n\pi\!:\!n\in l\}$
- B. $\{n\pi \, / \, 2 \colon n \in l\}$
- C. $\{n\pi\,/\,k\!:\!n\in l\}$
- D. $\{n\pi/2k\!:\!n\in l\}$

Answer: C





43. If A and B are two matrices such that AB=B and BA=A , then $A^2+B^2=$

A. 2BA

B. A+B

C. 2AB

D. None of these

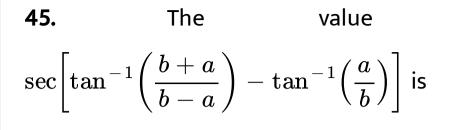
Answer: B

44. If |a| = |b| = 1 and $|a + b| = \sqrt{3}$, then the value of (3a - 4b)(2b + 5b) is

A.
$$-21$$

B. $-\frac{21}{2}$
C. 21
D. $\frac{21}{2}$

Answer: B



of

A. 2

B. $\sqrt{2}$

C. 4

D. 1

Answer: B

46. If, in $\Delta ABC, a=16, b=24, c=20$ then,

$$\sin\!\left(rac{A}{2}
ight) =_{_-}$$
 _

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

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

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

D. None of these

Answer: A

47. A person draws a card from a well shuffled pack of 52 playing cards. Replaces it and shuffles the pack. He continues doing so until he draws as pade. The chance that he fails first two times is

A.
$$\frac{9}{64}$$

B. $\frac{1}{64}$
C. $\frac{1}{16}$
D. $\frac{9}{16}$

Answer: D



48. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then, the probability of 2 successes is

A.
$$\frac{37}{256}$$

B. $\frac{219}{256}$
C. $\frac{128}{256}$
D. $\frac{28}{256}$





49. if $\Delta ABC, a = 18, b = 24, c = 30$, then

the area of the triangle is

A. 196

B. 216

C. 64

D. none of these

Answer: B





50. The number of values of θ in the interval $[-\pi,\pi]$ satisfying the equation $\cos heta+\sin2 heta=0$ is A. 1 B. 2 C. 3 D. 4

Answer: D



