MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 17

Mathematics

1. Find the equations of the circles touching y-axis at (0,3) and making an intercept of 8 units on the x-axis.

A. $x^2 + y^2 \pm 10x - 6y + 9 = 0$

B. $x^2 + y^2 \pm 6x - 10y + 9 = 0$

C. $x^2 + y^2 - 8x \pm 10y + 9 = 0$

D. $x^2 + y^2 + 10x \pm 6y + 9 = 0$

Answer: A

Watch Video Solution

2. The condition for a line y = 2x + c to touch the circle $x^2 + y^2 = 16$ is

A. c = 10

B. $c^2 = 80$

C. c = 12

D. $c^2 = 64$

Answer: B

Watch Video Solution

3. A line passes through the point of intersection of the line $3x + y + 1 = 0$ and $2x - y + 3 = 0$ and makes equal intercepts with axes. Then, equation of the line is

A. $5x + 5y - 3 = 0$

B. $x + 5y - 3 = 0$

C. $5x - y - 3 = 0$

D. $5x + 5y + 3 = 0$

Answer: A

Watch Video Solution

4. The equation of a line through the point (1, 2) whose distance from the point $(3, 1)$ has the greatest value is $y = 2x$ (b) $y = x + 1$ $x + 2y = 5$ (d) $y = 3x - 1$

A. y = 2x

B. y = x +1

C. x + 2y = 5

D. y = 3x -1

Answer: C

Watch Video Solution

5. If tangents are drawn from any point on the circle $x^2 + y^2 = 25$ the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ then the angle between the tangents is

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

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

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

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

Answer: D

Watch Video Solution

6. If $f(0) = f'(0) = 0$ and $f''(x) = \tan^2 x$ then f(x) is

A. $\log \sec x - \frac{x^2}{2}$

B. $\log \cos x + \frac{x^2}{2}$

C. $\log \sec x + \frac{x^2}{2}$

D. None of these

Answer: A

Watch Video Solution

7. If the line $x = a + m, y = -2$ and $y = mx$ are concurrent, then least value of $|a|$ is

A. 0

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. None of these

Answer: C

Watch Video Solution

8. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then adj (adj A) is

A. A

B. 2A

C. 3A

D. None of these

Answer: A

Watch Video Solution

9. If $y = \frac{a + bx^{\frac{3}{2}}}{x^{\frac{5}{4}}} \& \frac{dy}{dx}$ vanishes when $x = 5$ then $\frac{a}{b}$ is

A. $\sqrt{5} : 1$

B. $5 : 1$

C. $3 : 5$

D. $1 : 2$

Answer: A

Watch Video Solution

Watch Video Solution

10. $AandB$ are two independent events. The probability that both $AandB$ occur is 1/6 and the probability that neither of them occurs is 1/3. Find the probability of the occurrence of A.

A. 0 or 1

B. $\frac{1}{2}$ or $\frac{1}{3}$

C. $\frac{1}{2}$ or $\frac{1}{4}$

D. $\frac{1}{3}$ or $\frac{1}{4}$

Answer: B

Watch Video Solution

11. The value of integral $\int_0^1 \sqrt{\frac{1-x}{1+x}}dx$ is

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

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

C. -1

D. 1

Answer: B

Watch Video Solution

12. If $\lim_{x\to\infty}\left\{\frac{x^3+1}{x^2+1}-(ax+b)\right\}=2$, then

A. a = 1 and b = 1

B. a = 1 and b = -1

C. a = 1 and b = -2

D. a = 1 and b = 2

Answer: C

Watch Video Solution

13. A coin is tossed n times. The probability of getting head at least once is greater than 0.8. Then the least value of n is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

14. The value of $\frac{d}{dx}(|x-1|+|x-5|)$ at x = 3 is

A. -2

B. 0

C. 2

D. 4

Answer: B

Watch Video Solution

15. Area bounded by the curves $y = |x|$ and $y = 4 - |x|$ is

A. 4 sq unit

B. 16 sq unit

C. 2 sq unit

D. 8 sq unit

Answer: D

Watch Video Solution

16. If from each of the three boxes containing 3 white and 1 black, 2 white and 2 black, 1 white and 3 black balls, one ball is drawn at random, then the probability that 2 white and 1 black balls will be drawn, is

A. $\frac{13}{32}$

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

C. $\frac{1}{32}$

D. $\frac{3}{16}$

Answer: A

Watch Video Solution

17. The function $f(x) = \cot^{-1} x + x$ increases in the interval (a) $(1, \infty)$ (b) $(-1, \infty)$ (c) $(-\infty, \infty)$ (d) $(0, \infty)$

A. $(1, \infty)$

B. $(-1, \infty)$

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

D. $(0, \infty)$

Answer: C

Watch Video Solution

18. Let $\vec{a} = \hat{i} - \hat{k}$, $\vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k}$ and $\vec{c} = y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$, then $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$ depends on

A. Neither x nor y

B. Both x and y

C. Only x

D. Only y

Answer: A

Watch Video Solution

19. Given three straight lines $2x + 11y - 5 = 0, 24x + 7y - 20 = 0,$ and $4x - 3y - 2 = 0$. Then, they form a triangle one line bisects the angle between the other two two of them are parallel

A. form a right angled triangle

B. form an isosceles triangle

C. form an equilateral triangle

D. are concurrent

Answer: D

Watch Video Solution

20. The solution of the differential equation $xdy - ydx = \sqrt{x^2 + y^2}dx$ is

A. $x + \sqrt{x^2 + y^2} = cx^2$

B. $y - \sqrt{x^2 + y^2} = cx$

C. $x - \sqrt{x^2 - y^2} = cx$

D. $y + \sqrt{x^2 + y^2} = cx^2$

Answer: D

Watch Video Solution

21. A proposition is called a taulogoy, if it

A. always T

B. always F

C. sometimes T, sometimes F

D. None of the above

Answer: A

Watch Video Solution

22. If p : Ram is smart.

q : Ram is intelligent

Then, the symbolic form Ram is smart and intelligent is

A. $(P \wedge q)$

B. $(p \vee q)$

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

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

Answer: A

Watch Video Solution

23. $\int \left\{ \left(\frac{\log x - 1}{1 + (\log x)^2} \right\}^2 dx \right.$ is equal to

A. $\frac{x}{(\log x)^2 + 1} + C$

B. $\frac{xe^x}{1 + x^2} + C$

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

D. $\frac{\log x}{(\log x)^2 + 1} + C$

Answer: A

Watch Video Solution

24. The maximum value $P = 3x + 4y$ subjected to the constraints $x + y \leq 40, x + 2y \leq 60, x \geq 0$ and $y \geq 0$ is

A. 120

B. 140

C. 100

D. 160

Answer: B

Watch Video Solution

Watch Video Solution

25. A value of c for which the conclusion of Mean value theorem holds for the function $f(x) = \log_e x$ on the interval [1, 3] is

A. $2\log_3 e$

B. $\frac{1}{2}\log_e 3$

C. $\log_3 e$

D. $\log_e 3$

Answer: A

Watch Video Solution

26. The function f defined by

$f(x) = x^3 - 6x^2 - 36x + 7$ is increasing , if

A. $x > 2$ and also $x > 6$

B. $x > 2$ and also $x < 6$

C. $x > -2$ and also $x < 6$

D. $x < -2$ and also $x > 6$

Answer: D

Watch Video Solution

27. $\lim_{x \to 1} \cos^{-1}\left(\frac{1-\sqrt{x}}{1-x}\right)$ is equal to

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

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

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

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

Answer: A

Watch Video Solution

28. Derivative of $\sec^{-1}\left(\frac{1}{1-2x^2}\right)$ w.r.t. $\sin^{-1}\left(3x-4x^3\right)$ is

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

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

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

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

Answer: D

Watch Video Solution

29. $\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x} dx$ is

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

B. π^2

C. zero

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

Answer: B

Watch Video Solution

30. The area of the smaller region bounded by the circle $x^2 + y^2 = 1$ and the lines $|y| = x + 1$ is

A. $(\pi - 2)/4$

B. $(\pi - 2)/2$

C. $(\pi + 2)/2$

D. None of these

Answer: B

Watch Video Solution

31. Three digit numbers are formed with the digits 0,2,4,6 and 8. Write the probability of forming a three digit number with the same digits.

A. $\frac{1}{16}$

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

C. $\frac{1}{645}$

D. $\frac{1}{25}$

Answer: D

Watch Video Solution

32. The angle betwene the line $\vec{r} = (1+2\mu)\hat{i} + (2+\mu)\hat{j} + (2m-1)\hat{k}$ and the plane $3x - 2y = 6z = 0$ where μ is a scalar is (A) $\sin^{-1}\left(\frac{15}{21}\right)$ (B) $\cos^{-1}\left(\frac{16}{21}\right)$ (C) $\sin^{-1}\left(\frac{16}{21}\right)$ (D) $\frac{\pi}{2}$

A. $\sin^{-1}\left(\frac{15}{21}\right)$

B. $\cos^{-1}\left(\frac{16}{21}\right)$

C. $\sin^{-1}\left(\frac{16}{21}\right)$

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

Answer: C

Watch Video Solution

33. In $\triangle ABC$, if $(a+b+c)(a-b+c)$ = 3 ac, then

A. $\angle B = 60^\circ$

B. $\angle B = 30^\circ$

C. $\angle C = 60^\circ$

D. $\angle A + \angle C = 90^\circ$

Answer: A

Watch Video Solution

34. If $\cot x + \cos ecx = \sqrt{3}x$, then the principal value of $\left(x - \frac{\pi}{6}\right)$ is

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

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

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

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

Answer: D

Watch Video Solution

35. The midpoint of the chord $4x - 3y = 5$ of the hyperbola $2x^2 - 3y^2 = 12$ is

A. $\left(0, -\frac{5}{3}\right)$

B. $(2, 1)$

C. $\left(\frac{5}{4}, 0\right)$

D. $\left(\frac{11}{4}, 2\right)$

Answer: B

Watch Video Solution

36. Show that the sum of all odd integers between and 1000 which are divisible by 3 is 83667.

A. 83667

B. 90000

C. 83660

D. None of these

Answer: A

Watch Video Solution

37. The sum of infinity of the progression

$9 - 3 + 1 - \frac{1}{3} + \ldots$ is

A. 9

B. $9/2$

C. $27/4$

D. $15/2$

Answer: C

Watch Video Solution

38. Two finite sets A and 8 have m and n element respectively. If the total number of subsets of A is 112more than the total number of subsets of B, then the value of m is

A. 7

B. 9

C. 10

D. 12

Answer: A

 Watch Video Solution

39. If $A = \{1, 2, 3, 4\}$ and $B = \{1, 2, 3, 4, 5, 6\}$ are two sets and function $f: A \to B$ is defined by $f(x) = x + 2, \forall x \in A$, then the function f is

A. bijective

B. onto

C. one-one

D. many-one

Answer: C

Watch Video Solution

40. The angle between the pair of straight lines $y^2 \sin^2\theta - xy\sin^2\theta + x^2(\cos^2\theta - 1) = 0$ is

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

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

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

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

Answer: D

Watch Video Solution

41. A unit vector in xy-plane that makes an angle of 45^0 with the vector $\hat{i} + \hat{j}$ and angle of 60^0 with the vector

$3\hat{i} - 4\hat{j}$ is (A) $\hat{i}$ (B) $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$ (C) $\frac{\hat{i}-\hat{j}}{\sqrt{2}}$ (D) none of these

A. $\hat{i}$

B. $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

C. $\frac{\hat{i}-\hat{j}}{\sqrt{2}}$

D. None of these

Answer: D

Watch Video Solution

42. The function $\begin{cases} |x-3| & \text{if } x \geq 1 \\ \frac{x^2}{2} - \frac{3x}{2} + \frac{13}{4} & \text{if } x < 1 \end{cases}$ is

A. continuous and differentiable at x = 3

B. continuous at x = 3, but not differentiable at x = 3

C. continuous and differentiable everywhere

D. continous at x = 1, but not differentiable at x = 1

Answer: B

Watch Video Solution

43. if $y = x + x^2 + x^3 + \ldots\infty$, where $|x| < 1$, then for $|y| < 1$, $\frac{dx}{dy}$ is equal to

A. $y + y^2 + y^3 + \ldots. \infty$

B. $1 - y + y^2 - y^3 + \ldots. \infty$

C. $1 - 2y + 3y^2 - \ldots\infty$

D. $1 + 2y + 3y^2 + \ldots \infty$

Answer: C

Watch Video Solution

44. If

$$y = \tan^{-1}\left[\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}\right], \text{find } \frac{dy}{dx}$$

A. $\frac{x^2}{\sqrt{1-x^4}}$

B. $\frac{x^2}{\sqrt{1+x^4}}$

C. $\frac{x}{\sqrt{1+x^4}}$

D. $\frac{x}{\sqrt{1-x^4}}$

Answer: D

Watch Video Solution

45. For all values $of\theta, 3 - \cos\theta + \cos\left(\theta + \frac{\pi}{3}\right)$ lie in the interval

A. $[-2, 3]$

B. $[-2, 1]$

C. $[2.4]$

D. $[1, 5]$

Answer: C

Watch Video Solution

46. The value of $\cot\left(\cos ec^{-1}\frac{5}{3}+\tan^{-1}\frac{2}{3}\right)$ is

A. $\frac{5}{17}$

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

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

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

Answer: B

Watch Video Solution

47. The equation of pair of lines joining origin to the points of intersection of $x^2+y^2=9$ and $x+y=3$

A. $x^2 + (3 - x)^2 = 9$

B. $xy = 0$

C. $(3 + y)^2 + y^2 = 9$

D. $(x - y)^2 = 9$

Answer: B

Watch Video Solution

48. Three letters are written to different persons and addressess to three envelopes are also written. Without looking at the addresses, the probability that probability that the letters go into right envelopes, is

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

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

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

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

Answer: B

Watch Video Solution

49. A line makes acute angle of α, β and γ with the coordinate axes such that $\cos\alpha\cos\beta\cos\gamma = \frac{2}{9}$ and $\cos\gamma\cos\alpha = \frac{4}{9}$, then $\cos\alpha + \cos\beta + \cos\gamma$ is equal to

A. $\frac{25}{9}$

B. $\frac{5}{9}$

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

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

Answer: C

View Text Solution

50. The probability that number selected at random from that number 1, 2, 3, 4, 5, 6, 7, 8, ..., 100 is prime is

A. 0.4

B. 0.25

C. 0.45

D. 0.43

Answer: B