MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2019 PAPER 2

Mathematics

1. 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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2. 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 λ= .....

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

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

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

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

Answer: C

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3. The particular solution of the differential equation $\log\left(\frac{dy}{dx}\right)=x$, when 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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4. 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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5. If the function $f(x) = \frac{\left(e^{kx} - 1\right)\tan kx}{4x^2}, x \neq 0$

$= 16 \qquad x = 0$

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

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

B. ± 4

C. ± 2

D. ± 8

Answer: D

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6. The soluiton 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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7. The maximum value of $z = 6x + 8y$ subject to $x - y \geq 0, x + 3y \leq 12, x \geq 0$ is .....

A. 72

B. 42

C. 96

D. 24

Answer: A

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

A. 20

B. 22

C. 21

D. 19

Answer: A

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9. 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. $(p \rightarrow q) \vee (r \Leftrightarrow s)$

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

Answer: C

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10. 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. $3p(1 + 2p)$

Answer: B

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11. 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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12. If lines represented by $\left(1 + \sin^2\theta\right)x^2 + 2hxy + 2\sin\theta y^2 = 0, \theta \in [0, 2\pi]$ are perpendicu'lar to each other then θ = ...

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

B. π

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

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

Answer: C

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

A. $\{2\}$

B. $\{2, 5\}$

C. $\{2, 5, 10\}$

D. $\{1, 2, 5, 10\}$

Answer: B

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

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

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

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

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

Answer: B

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15. If A,B,C and D are {3,7,4),(5,-2,-3),(-4,5,6) and (1,2,3) respectively, then the value 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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16. 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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17. 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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18. If A is non- singular martix and $(A + l)(A - l) = 0$ then AA^{-1} = ...

A. 2A

B. 0

C. I

D. 3I

Answer: A

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

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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20. 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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21. If function

$$f(x) = x - \frac{|x|}{x}, x < 0$$

$$= x + \frac{|x|}{x}, x > 0$$

$$= 1, x = 0, \text{then}$$

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

B. $\lim_{x \to 0^+}$ f(x) dose not exist

C. f(x) is continous at x = 0

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

Answer: C

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22. In ΔABC if tan A + tan B+ tan C = 6 and tan A. tan B = 2 then tan C = ...

A. 3

B. 4

C. 1

D. 2

Answer: A

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23. 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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24. For L.P.P. maximize $z = 4x_1 + 2X_2$ subject to $3x_1 + 2x_2 \geq 9, x_1 - x_2 \leq 3, x_1 \geq 0, x_2 \geq 0$ has .....

A. infinite number of optimal solutions

B. unbounded solution

C. no solution

D. one optimal solution

Answer: B

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

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

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

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

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

Answer: A

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26. 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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27. 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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28. If three dices are thrown then the probability that the sum of the numbers on their uppermost 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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29. If $f(x) = 3x + 6, g(x) = 4x + k$ and $fog(x) = gof(x)$ then k .....

A. -9

B. 18

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

D. 9

Answer: D

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30. If the surn of an infinite GP be 9 and sum of first two terms be 5 then their common ratio is

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

B. 3

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

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

Answer: C

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

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

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

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

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

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

Answer: B

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33. 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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34. Using differentiation, approximate value of $f(x) = x^2 - 2x1$ at x=2.99

is . . .

A. 3.96

B. 9.96

C. 4.98

D. 5.98

Answer: A

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

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

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

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

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

Answer: D

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37. The value of sin 18° is

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

B. $\frac{\sqrt{5}-1}{2}$

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

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

Answer: B

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

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

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

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

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

Answer: D

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40. If $x^2 = e^{x-y}$, then $\frac{dy}{dx}$ at x = 1 is .....

A. e

B. 1

C. 0

D. -1

Answer: C

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41. 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. 5 l

D. 4l

Answer: D

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42. Which of the following statements is contingency?

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

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

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

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

Answer: C

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

A. $a+b$

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

C. $a-b$

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

Answer: B

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44. 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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45. The equation of the circle concentric with the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ and touching y axis

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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46. $\int_0^a x(1-x)^5 dx = \ldots\ldots .$

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

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

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

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

Answer: B

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

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

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

C. 0

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

Answer: C

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

A. b

B. $a+b+c$

C. a

D. c

Answer: C

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

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

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

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

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

Answer: A

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