MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2019 PAPER 1

Mathematics

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

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

B. $\frac{x_1^2 + y_1^2}{a^2}$

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. The order of the differential equation of all circles whose radius is 4, is ..... .

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

$= -1, x = 0$

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. 19/1024

C. 19/2048

D. 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=..... .

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 statement pattern $(p \wedge q) \wedge [(p \wedge q)] \vee (-p \wedge q)$ is equivalent to . .....

A. $p \vee q$

B. q

C. $p \wedge q$

D. p

Answer: B

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11. A bag contarns 6 white and 4 black balls. Two balls are drawn at random. The probability that they are of the same colour 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. $\log |\cos x + x \sin x| + c$

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. $40cm^2/\sec$

C. $50cm^2/\sec$

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 $p \to q$.

A. p only if q

B. q is necessary for p

C. q only if P

D. p is sufficient for q

Answer: C

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

.

A. a, b and c

B. k

C. a and b

D. 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 non-singular matrix such that $(A - 2l)(A - 4l) = 0$ 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. $\tan^{-1}x + \frac{1}{2(x^2+1)} + c$

Answer: B

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

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. For a GP, if $(m+n)^{th}$ term is p and $(m-n)^{th}$ term is q, then m^{th} 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

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 equation of 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 $P(27 \leq x \leq 33) = \ldots$

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 $\frac{x-2}{1}=\frac{y-3}{2}=\frac{z-5}{2}$ and $\frac{x-2}{2}=\frac{y-3}{-2}=\frac{z-5}{1}$ is .....

A. 30°

B. 60°

C. 45°

D. 90°

Answer: D

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32. If the line passes through the points P(6, -1, 2), Q (8, -7, 2A) 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 $A = \left\{x \in R / x^2 + 5|x| + 6 = 0\right\}$ then n(A)= . . .

A. 2

B. 0

C. 1

D. 4

Answer: D

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35. If the 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. $\int_0^4 \frac{1}{1+\sqrt{x}} dx$=.....

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

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

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

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

Answer: C

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

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

A. 80

B. 95

C. 105

D. 30

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. 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) is $\cdots\cdots$

A. $r5\hat{i} + 2\dot{\hat{j}} + 2\hat{k} = 1$

B. $r5\hat{i} + 2\dot{\hat{j}} + 2\hat{k} = -1$

C. $r5\hat{i} - 2\dot{\hat{j}} + 2\hat{k} = -5$

D. $r5\hat{i} - 2\dot{\hat{j}} - 2\hat{k} = 1$

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. The value of

$$\frac{\tan^{-1}1}{3}+\frac{\tan^{-1}1}{5}+\frac{\tan^{-1}1}{7}+\frac{\tan^{-1}1}{8}$$

is .....

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. $X - 3\ y - 9 = 0$

D. $X + 3\ y - 9 = 0$

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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