MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2009

Mathematics

1. The approximate value of $\sqrt[3]{28}$ is

A. 3.0037

B. 3.037

C. 3.0086

D. 3.37

Answer: B

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2. If D_{30} is the set of all divisors of 30 , x, $y \in D_{30}$, we define $x + y = LCM(x, y), x \cdot y = GCD(x, y), x' = \frac{30}{x}$ and $f(x, y, z) = (x +$, then f(2,5,15) is equal to

A. 2

B. 5

C. 10

D. 15

Answer: C

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3. Locus of the point of intersection of perpendicular tangents to the circle $x^2 + y^2 = 16$ is

A. $x^2 + y^2 = 8$

B. $x^2 + y^2 = 32$

C. $x^2 + y^2 = 64$

D. $x^2 + y^2 = 16$

Answer: B

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4. If $A = \begin{bmatrix} 3 & 2 & 4 \\ 1 & 2 & 1 \\ 3 & 2 & 6 \end{bmatrix}$ and A_{ij} are the cofactors of a_{ij}, then $a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$ is equal to

A. 8

B. 6

C. 4

D. 0

Answer: A

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5. Given $\vec{P} = 3\hat{i} + 2\hat{j} + 5\hat{k}$, $\vec{a} = \hat{i} + \hat{j}$, $\vec{b} = \hat{j} + \hat{k}$, $\vec{c} = \hat{i} + \hat{k}$ and $\vec{P} = x\vec{a} +$

, then x,y,z are respectively

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

B. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$

C. $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$

D. $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

Answer: B

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6. A point on XOZ- plane divides tha join of (5,-3,-2) and (1,2,-2) at

A. $\left(\frac{13}{5}, 0, -2\right)$

B. $\left(\frac{13}{5}, 0, 2\right)$

C. $(5, 0, 2)$

D. $(5, 0, -2)$

Answer: A

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7. If the line $\overrightarrow{OR}$ makes angles $\theta_1, \theta_2, \theta_3$ with the planes XOY, YOZ, ZOX respectively , then $\cos^2\theta_1 + \cos^2\theta_2 + \cos^2\theta_3$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: A

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8. Joint equation of pair of lines through $(3, -2)$ and parallel to $x^2 - 4xy + 3y^2 = 0$ is

A. $x^2 + 3y^2 - 4xy - 14x + 24y + 45 = 0$

B. $x^2 + 3y^2 + 4xy - 14x + 24y + 45 = 0$

C. $x^2 + 3y^2 + 4xy - 14x + 24y - 45 = 0$

D. $x^2 + 3y^2 + 4xy - 14x - 24y - 45 = 0$

Answer: A

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9. $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ and $AB = BA = I$, then B is equal to

A. $\begin{bmatrix} -\cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$

B. $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

C. $\begin{bmatrix} -\sin\theta & \cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$

D. $\begin{bmatrix} \sin\theta & -\cos\theta \\ -\cos\theta & \sin\theta \end{bmatrix}$

Answer: B

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10. If the equation given by $hxy + 10x + 6y + 4 = 0$ represents a pair of lines, then h is equal to

A. 15

B. 30

C. 5

D. 10

Answer: A

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11. Area bounded between the curve $x^2 = y$ and the line y = 4x is

A. $\frac{32}{3}$ sq. unit

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

C. $\frac{8}{3}$ sq unit

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

Answer: A

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12. Find $\frac{dy}{dx}$, if $x = 2\cos\theta - \cos 2\theta$ and y = 2sin theta - sin 2 theta `.

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

B. $-\tan\frac{3\theta}{2}$

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

D. $-\cot \frac{3\theta}{2}$

Answer: A

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13. The equation of motion of a particle moving along a straight line is $s = 2t^3 - 9t^2 + 12t$, where the units of s and t are centrimetre and second. The acceleration of the particle will be zero after

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

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

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

D. $1s$

Answer: A

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14. Which of the following is true ?

A. $\int_0^1 e^x dx = e$

B. $\int_0^1 2^x dx = \log 2$

C. $\int_0^1 \sqrt{x} dx = \frac{2}{3}$

D. $\int_0^1 x dx = \frac{1}{3}$

Answer: C

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15. The equation of the tangent to the curve $y = 4xe^x$ at $\left(-1, \frac{-4}{e}\right)$ is

A. y=-1

B. $y = -\frac{4}{e}$

C. $x = -1$

D. $x = \frac{-4}{e}$

Answer: B

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16. Given $P(A \cup B) = 0.6, P(A \cap B) = 0.2$, then probability of exactly one of the event occurs is

A. 0.4

B. 0.2

C. 0.6

D. 0.8

Answer: A

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17. From a group of 8 boys and 3 girls, a committee of 5 members to be formed. Find the probability that 2 particular girls are included in the

committee.

A. $\frac{4}{11}$

B. $\frac{2}{11}$

C. $\frac{6}{11}$

D. $\frac{8}{11}$

Answer: B

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18. Given P(A)=0.56 , P(B)=0.4 , $P(A \cap B) = 0.3$, then P(A'/B') is equal to

A. $1/3$

B. $1/2$

C. $2/3$

D. $3/4$

Answer: C

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19. Equation of the plane passing through (-2,2,2) and (2,-2,-2) and perpendicular to the plane 9x-13y-3z=0 is

A. $5x + 3y + 2z = 0$

B. $5x - 3y + 2z = 0$

C. $5x - 3y - 2z = 0$

D. $5x + 3y - 2z = 0$

Answer: A

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20. The maximum vlaue of $Z = 9x + 13y$ subject to constraints $2x + 3y \leq 18, 2x + y \leq 10, x \geq 0, y \geq 0$ is

A. 130

B. 81

C. 79

D. 99

Answer: C

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21. Find the function $f(x_1, x_2, x_3)$ satisfying $f(x^1, x_2, x_3)$=1 at $x_1 = 1, x_2 = x_3 = 0$.

A. $x_1' \cdot x_2$

B. $x_1 \cdot x_2'$

C. $(x_1 + x_2 + x_3)' \cdot x_2$

D. $(x_1' + x_3) \cdot x_3$

Answer: B

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22. Given $f(x) = \frac{ax+b}{x+1}$, $\lim_{x \to \infty} f(x) = 1$ and $\lim_{x \to 0} f(x) = 2$, then f(-2) is

A. 0

B. 1

C. 2

D. 3

Answer: A

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23. $\lim_{x \to 1} (\log ex)^{1/\log x}$ is equal to

A. e^{-1}

B. e

C. e^2

D. 0

Answer: B

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24. $\int [\sin(\log x) + \cos(\log x)]dx$

A. $x\cos(\log x) + c$

B. $\cos(\log x) + c$

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

D. $\sin(\log x) + c$

Answer: C

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

A. $\frac{e^x}{x^2} + c$

B. $\frac{-e^x}{x^2} + c$

C. $\frac{e^x}{x} + c$

D. $\frac{-e^x}{x} + c$

Answer: C

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26. $\int_5^{10} \frac{1}{(x-1)(x-2)} dx$ is equal to

A. $\log \frac{27}{32}$

B. $\log \frac{32}{27}$

C. $\log \frac{8}{9}$

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

Answer: B

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27. For a certain function u_x, given that $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$, then $\Delta^5 u_x$ is equal to

A. 750

B. 778

C. 765

D. 755

Answer: D

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28. The value of $\left(\frac{\Delta^2}{E}\right) x^3$ at h=1 is

A. 8x

B. 6x

C. $5x^2$

D. $6x^2$

Answer: B

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29. General solution of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+y-1}$ is given by

A. $x + y = \log|x + y| + c$

B. $x - y = \log|x + y| + c$

C. $y = x + \log|x + y| + c$

D. $y = x\log|x + y| + c$

Answer: C

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30. The order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 - \left(\frac{dy}{dx}\right)^4}$ are respectively

A. 2,3

B. 3,2

C. 2,4

D. 2,2

Answer: A

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31. Form of the differential equation of all family of lines $y = mx + \frac{4}{m}$ by eliminating the arbitrary constant m is

A. $\frac{d^2y}{dx^2} = 0$

B. $x\left(\frac{dy}{dx}\right)^2 - y\left(\frac{dy}{dx}\right) + 4 = 0$

C. $x\left(\frac{dy}{dx}\right)^2 + y\frac{dy}{dx} + 4 = 0$

D. $\frac{dy}{dx} = 0$

Answer: B

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32. The focal distance of a point P on the parabola $y^2 = 12x$ if the ordinate of P is 6, is

A. 12

B. 6

C. 3

D. 9

Answer: B

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33. Focus of hyperbola is $(\pm 3, 0)$ and equation of tangent is $2x + y - 4 = 0$, find the equation of hyperbola is

A. $4x^2 - 5y^2 = 20$

B. $5x^2 - 4y^2 = 20$

C. $4x^2 - 5y^2 = 1$

D. $5x^2 - 4y^2 = 1$

Answer: A

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34. If $4x - 3y + k = 0$ touches the ellipse $5x^2 + 9y^2 = 45$, then k is equal to

A. $\pm 3\sqrt{21}$

B. $3\sqrt{21}$

C. $-3\sqrt{21}$

D. $2\sqrt{21}$

Answer: A

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35. If m_1 and m_2 are the slopes of tangents to $x^2 + y^2 = 4$ from the point $(3, 2)$, then $m_1 - m_2$ is equal to

A. $\frac{5}{12}$

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

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

D. 0

Answer: B

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36. If θ is the angle between the lines $ax^2 + 2hxy + by^2 = 0$, then angle between $x^2 + 2xy\sec\theta + y^2 = 0$ is

A. θ

B. 2θ

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

D. 3θ

Answer: A

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37. find the derivative of $e^x + e^y = e^{x+y}$

A. $-e^{x-y}$

B. e^{x-y}

C. $-e(y-x)$

D. $e(y-x)$

Answer: C

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38. If $xy = \tan^{-1}(xy) + \cot^{-1}(xy), \quad \text{then} \frac{dy}{dx}$ is equal to

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

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

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

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

Answer: B

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39. Find a polynomial f(x) of degree 2 where f(0)=8, f(1)=12, f(2)=18

A. $x^2 + 3x - 8$

B. $x^2 - 3x + 8$

C. $2x^2 - x + 3$

D. $x^2 + 3x + 8$

Answer: D

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40. Tangent to the ellipse $\frac{x^2}{32} + \frac{y^2}{18} = 1$ having slope $-\frac{3}{4}$ meet the coordinates axes in A and B. Find the area of the ΔAOB , where O is the origin .

A. 12 sq. unit

B. 8 sq unit

C. 24 sq unit

D. 32 sq unit

Answer: C

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41. $\int x \log x dx$ is equal to

A. $\frac{x^2}{4}(2\log x - 1) + c$

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

C. $\frac{x^2}{4}(2\log x + 1) + c$

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

Answer: A

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42. $\int_0^{\pi/2} \frac{\sin x - \cos x}{1 - \sin x \cdot \cos x} dx$ is equal to

A. 0

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

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

D. π

Answer: A

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43. Volume of the parallelopiped having vertices at $O \equiv (0, 0, 0), A \equiv (2, -2, 1), B \equiv (5, -4, 4), \text{ and } C = (1, -2, 4)$ is

A. 5 cu unit

B. 10 cu unit

C. 15 cu unit

D. 20 cu unit

Answer: B

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44. If $2\vec{a} + 3\vec{b} - 5\vec{c} = \vec{0}$, then ratio in which $\vec{c}$ divides $\overrightarrow{AB}$ is

A. 3:2 internally

B. 3:2 externally

C. 2:3 internally

D. 2:3 externally

Answer: A

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45. $\sim(\sim p \to q) \equiv$

A. $p \wedge \sim q$

B. $\sim p \wedge q$

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

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

Answer: C

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46. Simplify the following circuit and find the boolean polynomial .

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

B. $p \wedge (q \vee r)$

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

D. $p \wedge (q \wedge r)$

Answer: A

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47. Simplify $(p \vee q) \wedge (p \vee \sim q)$.

A. p

B. T

C. F

D. q

Answer: A

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48. Equation of tangent to the parabola $y^2 = 16 \times$ at P(3,6) is

A. $4x - 3y + 12 = 0$

B. $3y - 4x - 12 = 0$

C. $4x - 3y - 24 = 0$

D. $3y - x - 24 = 0$

Answer: B

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49. If $\lim_{x \to 1} \frac{(e^k - 1)\sin kx}{x^2} = 4$, then k is equal to

A. 2

B. -2

C. ± 2

D. ± 4

Answer: C

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50. The derivative of $\cos x^3$ w.r.t. x^3 is

A. $-\cot x$

B. $\cot x$

C. $\tan x$

D. $-\tan x$

Answer: A

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