MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2008

Mathematics

1. The equations of the tangents to the circle $x^2 + y^2 = 13$ the point whose abscissa is 2,

are

A. $2x + 3y = 13, 2x - 3y = 13$

B. $3x + 2y = 13, 2x - 3y = 13$

C. $2x + 3y = 13, 3x - 2y = 13$

D. None of the above

Answer: A

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2. If $\vec{a} \cdot \hat{i} = 4$ then $\left(\vec{a} \times \hat{j}\right) \cdot \left(2\hat{j} - 3\hat{k}\right)$ is equal to

A. 12

B. 2

C. 0

D. -12

Answer: D

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3. Prove th the following sets of three points are collinear:

$$-2\vec{a}+3\vec{b}+5\vec{c},\ \vec{a}+2\vec{b}+3\vec{c},\ 6\vec{a}-\vec{c}$$

A. $-4\vec{a}$

B. $4\vec{a}-\vec{b}-\vec{c}$

C. $\vec{c}$

D. None of the above

Answer: D

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4. If $y = \log_{10} x + \log_x 10 + \log_x x + \log_{10} 10$ then what is $\left(\frac{dy}{dx}\right)_{x=10}$ equal to?

A. $\frac{1}{x \log_e 10} - \frac{\log_e 10}{x(\log_e x)^2}$

B. $\frac{1}{x \log_e 10} - \frac{1}{x \log_{10} e}$

C. $\frac{1}{x \log_e 10} + \frac{1}{x(\log_e x)^2}$

D. None of the above

Answer: A

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5. $\int \frac{x^{e-1}+e^{x-1}}{x^2+e^x}$ dx is equal to

A. $\log(x^e+e^x)+c$

B. $e\log(x^e+e^x)+c$

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

D. None of the above

Answer: C

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6. The value of $\int_{\pi/4}^{\pi/2} e^x(\log \sin x + \cot x)dx$ is

A. $e^{\pi/4}\log 2$

B. $-e^{\pi/4}\log 2$

C. $\frac{1}{2}e^{\pi/4}\log 2$

D. $-\frac{1}{2}e^{\pi/4}\log 2$

Answer: C

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7. Considering four sub-intervals, the value of $\int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule, is

A. 0.6870

B. 0.6677

C. 0.6977

D. 0.5970

Answer: C

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8. By Simpson's rule, value of $\int_1^2 \frac{dx}{x}$ dividing the interval (1,2) into four equal parts, is

A. 0.6932

B. 0.6753

C. 0.6692

D. 7.1324

Answer: A

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9. Area bounded by the lines $y = x, x = -1, x = 2$ and x-axis is

A. 5/2 sq unit

B. 3/2 sq unit

C. 1/2 sq unit

D. None of the above

Answer: A

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10. The focal distance of a point on the parabola $y^2 = 16x$ whose ordinate is twice the abscis is

A. 6

B. 8

C. 10

D. 12

Answer: B

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11. if the line $x\cos\alpha + y\sin\alpha = p$ is normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ then

A. $p^2\left(a^2\cos^2\alpha + b^2\sin^2\alpha\right) = a^2 - b^2$

B. $p^2\left(a^2\cos^2\alpha + b^2\sin^2\alpha\right) = \left(a^2 - b^2\right)$

C. $p^2\left(a^2\sec^2\alpha + b^2\cos ec^2\alpha\right) = a^2 - b^2$

D.

$$p^2\left(a^2\sec^2\alpha + b^2\cos ec^2\alpha\right) = \left(a^2 - b^2\right)^2$$

Answer: D

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12. The inverse matrix of $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$ is

A. $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & -1 \\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$

B. $\begin{bmatrix} \frac{1}{2} & -4 & \frac{5}{2} \\ 1 & -6 & 3 \\ 1 & 2 & -1 \end{bmatrix}$

C. $\frac{1}{2}\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 4 & 2 & 3 \end{bmatrix}$

D. $\frac{1}{2}\begin{bmatrix} 1 & -1 & -1 \\ -8 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix}$

Answer: A

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13. The equation $12x^2 + 7xy + ay^2 + 13x - y + 3 = 0$ represents a pair of perpendicular lines. Then, the value of a is

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

B. -19

C. -12

D. 12

Answer: C

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14. The symmetric equation of lines $3x + 2y + z - 5 = 0$ and $x + y - 2z - 3 = 0$, is

A. $\frac{x-1}{5} = \frac{y-4}{7} = \frac{z-0}{1}$

B. $\frac{x+1}{5} = \frac{y+4}{7} = \frac{z-0}{1}$

C. $\frac{x+1}{-5} = \frac{y-4}{7} = \frac{z-0}{1}$

D. $\frac{x-1}{-5} = \frac{y-4}{7} = \frac{z-0}{1}$

Answer: C

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15. A wholesale merchant wants to start the business of cereal with ₹ 24000. Wheat is ₹ 400 per quintal and rice is ₹ 600 per quintal. He has capacity to store 200 quintal cereal. He earns the profit ₹ 25 per quintal on wheat and 40 per quintal on nee. If he stores x quintal rice and y quintal wheat, then for maximum profit the objective function is

A. $25x + 40y$

B. $40x + 25y$

C. $400x + 600y$

D. $\frac{400}{40}x + \frac{600}{25}y$

Answer: B

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16. The chances to fail in Physis are 20% and the chances to fail in Mathematics are 10%.

What are the chances to fail in atleast one subject ?

A. 0.28

B. 0.38

C. 0.72

D. 0.82

Answer: A

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17. $\lim_{x \to 0} \frac{\cos ax - \cos bx}{x^2}$ is equal to

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

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

C. $a^2 - b^2$

D. $b^2 - a^2$

Answer: B

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18. If $f(x) = \begin{cases} x \sin\frac{1}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x=0, then the value of k is

A. 1

B. -1

C. 0

D. 2

Answer: C

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19. The solution of the differential equation $\frac{dy}{dx} = \frac{x - y + 3}{2x(x - y) + 5}$ is

A. $2(x - y) + \log(x - y) = x + c$

B. $2(x - y) - \log(x - y + 2) = x + c$

C. $2(x - y) + \log(x - y + 2) = x + c$

D. None of the above

Answer: C

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20. If $x = \frac{1-t^2}{1+t^2}$ and $y = \frac{2t}{1+t^2}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{a(1-t^2)}{2t}$

B. $\frac{a(t^2-1)}{2t}$

C. $\frac{a(t^2+1)}{2t}$

D. $\frac{a(t^2-1)}{t}$

Answer: B

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21. The velocity of particle at time t is given by the relation $v = 6t - \frac{t^2}{6}$. The distance traveled in 3 s is, if s=0 at t=0

A. $\frac{39}{2}$

B. $\frac{57}{2}$

C. $\frac{51}{2}$

D. $\frac{33}{2}$

Answer: C

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22. The maximum value of function $f(x) = x^3 - 12x^2 + 36x + 17$ in the interval $[1, 10]$ is 17 b. 177 c. 77 d. none of these

A. 17

B. 177

C. 77

D. None of these

Answer: B

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23. $\vec{a} \times \left[\vec{a} \times \left(\vec{a} \times \vec{b}\right)\right]$ is equal to

A. $\left(\vec{a} \times \vec{a}\right).\left(\vec{b} \times \vec{a}\right)$

B. $\vec{a}.\left(\vec{a} \times \vec{b}\right) - \vec{b}\left(\vec{a} \times \vec{b}\right)$

C. $\left[\vec{a}.\left(\vec{a} \times \vec{b}\right)\right]\vec{a}$

D. $\left(\vec{a}.\vec{a}\right)\left(\vec{b} \times \vec{a}\right)$

Answer: D

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24. If one end of the diameter is (1, 1) and the other end lies on the line $x + y = 3$, then find the locus of the center of the circle.

A. x+y=1

B. 2(x-y)=5

C. 2x+2y=5

D. None of these

Answer: C

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25. For the circuits shown below, the Boolean polynimial is

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

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

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

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

Answer: D

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26. Dual of $(x' \vee y')' = x \wedge y$ is

A. $(x' \vee y')' = x \vee y$

B. $(x' \wedge y')' = x \vee y$

C. $(x' \wedge y')' = x \wedge y$

D. None of the above

Answer: B

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27. Negation of the conditional "If it rains, I shall go to school" is

A. It rains and I shall go to school

B. It rains and I shall not go to school

C. It does not ranis and I shall go to school

D. None of the above

Answer: B

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28. The value of $\int x \sin x \sec^3 x dx$ is

A. $\frac{1}{2}\left[\sec^2 x - \tan x\right] + c$

B. $\frac{1}{2}\left[x \sec^2 x - \tan x\right] + c$

C. $\frac{1}{2}\left[x \sec^2 x + \tan x\right] + c$

D. $\frac{1}{2}\left[\sec^2 x + \tan x\right] + c$

Answer: B

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29. The value of $\int_0^{\pi} x \sin^3 x dx$ is

A. $\frac{4\pi}{3}$

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

C. 0

D. None of these

Answer: B

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30. A parents has two children. If one of them is boy, then the probability that other is, also a boy is

A. $1/2$

B. $1/4$

C. $1/3$

D. None of these

Answer: C

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31. For the LPP Min $z = x_1 + x_2$ such that inequalities

$5x_1 + 10x_2 \geq 0, x_1 + x_2 \leq 1, x_2 \leq 4$ and

$x -_1 , x_2 \geq 0$

A. There is a baunded solution

B. Thereis no solution

C. There are infinite solutions

D. None of the above

Answer: A

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32. Find ten equation of the plane passing through the point $(0, 7, -7)$ and containing the line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$.

A. $x + y + z = 1$

B. $x + y + z = 2$

C. $x + y + z = 0$

D. None of these

Answer: C

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33. Angle of intersection of the curve $r = \sin\theta + \cos\theta$ and $r = 2\sin\theta$ is equal to

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

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

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

D. None of these

Answer: C

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34. The equation of the tangent parallel to $y - x + 5 = 0$ drawan to $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

A. $x - y - 1 = 0$

B. $x - y + 2 = 0$

C. $x + y - 1 = 0$

D. $x + y + 2 = 0$

Answer: A

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35. The volume of solid generated by revolving about the y-axis the figure bounded by the parabola $y = x^2$ and $x = y^2$ is

A. $\frac{21}{5}\pi$

B. $\frac{24}{5}\pi$

C. $\frac{2}{15}\pi$

D. $\frac{5}{24}\pi$

Answer: C

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36. The value of $\Delta \log f(x) + \Delta^2(3^x)$ is

A. $\log\left[1 + \dfrac{\Delta f(x)}{f(x)}\right] + 4.3^x$

B. $\log\left[1 + \dfrac{\Delta f(x)}{f(x)}\right] + 3^x$

C. $\log\left[\dfrac{\Delta f(x)}{1 + f(x)}\right] + 4.3^x$

D. $\log\left[\dfrac{\Delta f(x)}{1 + f(x)}\right] + 3^x$

Answer: A

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37. Show that $(3xy + x^2)dy + (y^2 + xy)dx = 0$ is homogeneous differential equation. Also find its general solution.

A. $x^2(2xy + y^2) = c^2$

B. $x^2(2xy - y^2) = c^2$

C. $x^2(y^2 - 2xy) = c^2$

D. None of these

Answer: A

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38. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}} - 4\frac{dy}{dx} - 7x = 0$ are

A. 1 and 1/2

B. 2 and 1

C. 1 and 1

D. 1 and 2

Answer: D

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39. If $f(x) = \sqrt{\frac{x - \sin x}{x + \cos^2 x}}$, then $\lim_{x \to \infty} f(x)$ is

A. 0

B. ∞

C. 1

D. None of these

Answer: C

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40. If the vectors $\hat{i} - 3\hat{j} + 2\hat{k}, -\hat{i} + 2\hat{j}$ represents the diagonals of a parallelogram, then its area will be

A. $\sqrt{21}$

B. $\frac{\sqrt{21}}{2}$

C. $2\sqrt{21}$

D. $\frac{\sqrt{21}}{4}$

Answer: B

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41. The position vectors of the points A,B and C are $\left(2\hat{i}+\hat{j}-\hat{k}\right), \left(3\hat{i}-2\hat{j}+\hat{k}\right)$ and $\left(\hat{i}+4\hat{j}-3\hat{k}\right)$ respectively. Show that the points A,B and C are collinear.

A. form an isosceles treangle

B. form a right angled triangle

C. are collinear

D. form a scalene triangle

Answer: C

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42. The equation of common tangent of $x^2 + y^2 = 2$ and $y^2 = 8x$ is

A. y=x+1

B. y=x+2

C. y=x-2

D. y=-x+2

Answer: B

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43. If $y = x^n \log x + x(\log x)^n$, then $\frac{dy}{dx}$ is equal to

A.

$$x^{n-1}(1 + n\log x) + (\log x)^{n+1}[n + \log x]$$

B.

$$x^{n-2}(1 + n\log x) + (\log x)^{n-1}[n + \log x]$$

C.

$$n^{n-1}(1 + n\log x) + (\log x)^{n-1}[n - \log x]$$

D. None of the above

Answer: A

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44. If $x^3 + y^3 = 3axy$, find $\frac{dy}{dx}$

A. $\frac{ay - x^2}{y^2 - ax}$

B. $\frac{ay - x^2}{ay - y^2}$

C. $\frac{x^2 + ay}{y^2 + ax}$

D. $\frac{x^2 + ay}{ax - y^2}$

Answer: A

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45. The region rprsented by the inequation system $x, y \geq 0, y \leq 6, x + y \leq 3,$ is

A. unbounded in first quadrant

B. unboded in first and second quadrants

C. bounded in first quadrant

D. None of the above

Answer: C

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46. A random variable X has the probaility distribution

For the events E ={x is prime number } and $F = \{x < 4\}$ the probability of $P(E \cup F)$ is

A. 0.50

B. 0.77

C. 0.35

D. 0.87

Answer: B

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47. The solutiion of (x, y, z) the equation

$$\begin{bmatrix} -1 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$ is (x, y, z)

A. (1,1,1)

B. (0,-1,2)

C. (-1,2,2)

D. (-1, 0, 2)

Answer: D

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48. The point of the curve $y^2 = 2(x - 3)$ at which the normal is parallel to the line $y - 2x + 1 = 0$ si

A. (5,2)

B. $\left(-\frac{1}{2}, -2\right)$

C. (5,-2)

D. $\left(\frac{3}{2}, 2\right)$

Answer: C

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49. If $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 3$ and $\vec{a}, \vec{b}$ are mutually perpendicular, then the area of the

triangle whose vertices are $\vec{0}, \vec{a}+\vec{b}, \vec{a}-\vec{b}$ is

A. 5

B. 1

C. 6

D. 8

Answer: C

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50. The abscissa of the points, where the tangent to curve $y = x^3 - 3x^2 - 9x + 5$ is parallel to X-axis are

A. x=0 and 0

B. x=1 and -1

C. x=1 and -3

D. x=-1 and 3

Answer: D

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