MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2007

Mathematics

1. The derivative of log|x| is

A. $\frac{1}{x}, x > 0$

B. $\frac{1}{|x|}, x \neq 0$

C. $\frac{1}{x}, x \neq 0$

D. None of these

Answer: C

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2. $\int \frac{x+\sin x}{1+\cos x}$ is equal to

A. $x\frac{\tan(x)}{2}+c$

B. $\log(1+\cos x)+c$

C. $\frac{\cot(x)}{2}+c$

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

Answer: A

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3. Write the order of the differential equation whose solution is $y = a\cos x + bs \in x + ce^{-x}$.

A. 3

B. 1

C. 2

D. 4

Answer: A

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4. The slope of the tangent at (x, y) to a curve passing through $\left(1, \frac{\pi}{4}\right)$ is given by $\frac{y}{x} - \cos^2\left(\frac{y}{x}\right)$, then the equation of the curve is (a) $(b)(c)y = (d)(e)\tan^{(f)\,(g)\,-1(h)}\,(i)\left((j)(k)\log\left((l)(m)(n)\frac{e}{o}x(p)(q)(r)\right)(s)$ (u) (v) *[Math Processing Error]* (pp) (qq) *[Math Processing Error]* (kkk) (d) none of these

A. $y = \tan^{-1}\left[\log\left(\frac{e}{x}\right)\right]$

B. $y = x\tan^{-1}\left[\log\left(\frac{x}{e}\right)\right]$

C. $y = x\tan^{-1}\left[\log\left(\frac{e}{x}\right)\right]$

D. None of these

Answer: C

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5. The area of the circle centred at (1,2) and passing through (4,6) is

A. 5π sq unit

B. 5π sq unit

C. 5π sq unit

D. None of the above

Answer: D

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6. The equation to the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is

A. $x + 2y + 4 = 0$

B. $2x + y - 4 = 0$

C. $x - 2y - 4 = 0$

D. $x - 2y + 4 = 0$

Answer: A

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7. The parametric representation of a point on the ellipse whose foci are (-1, 0) and (7, 0) and eccentricity 1/2, is

A. $\left(3 + 8\cos\theta, 4\sqrt{3}\sin\theta\right)$

B. $\left(8\cos\theta, 4\sqrt{3}\sin\theta\right)$

C. $\left(3 + 4\sqrt{3}\cos\theta, 8\sin\theta\right)$

D. None of the above

Answer: B

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8. If $f: R \to R$ be mapping defined by $f(x) = x^2 + 5$, then $f^{-1}(x)$ is equal to

A. $(x+5)^{1/3}$

B. $(x-5)^{1/3}$

C. $(5-x)^{1/3}$

D. $5 - x$

Answer: A

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9. Let $f(x) = \frac{ax+b}{cx+d}$. Then the $fof(x) = x$, provided that : $(a \neq 0, b \neq 0, c \neq 0, d \neq 0)$

A. d=-a

B. d=a

C. a=b=c=d=1

D. a=b=1

Answer: D

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10. The differential equation of all parabolas whose axis are parallel to the y-axis is (a) $(b)(c)(d)\frac{(e)(f)d^{(g)3(h)}(i)y}{j}\Big((k)d(l)x^{(m)3(n)}(o)\Big)(p)(q) = 0(r)$ (s) (b) $(t)(u)(v)\frac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\Big((cc)d(dd)y^{(ee)2(ff)}(gg)\Big)(hh)(ii) = C(jj$ (kk) (c) *[Math Processing Error]* (ii) (d) *[Math Processing Error]* (ggg)

A. $y_2 = 2y_1 + x$

B. $y_3 = 2y_1$

C. $y_2^3 = y_1$

D. None of these

Answer: B

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11. The value of $\lim_{x \to 0} \frac{\cos(\sin x) - \cos x}{x^4}$ is equal to

A. $1/5$

B. $1/6$

C. $1/4$

D. $1/2$

Answer: C

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12. If $A = \begin{bmatrix} \cos^2 \alpha & \cos \alpha \sin \alpha \\ \cos \alpha \sin \alpha & \sin^2 \alpha \end{bmatrix}$ and $B = \begin{bmatrix} \cos^2 \beta s & \cos \beta \sin \beta \\ \cos \beta \sin \beta & \sin^2 \beta \end{bmatrix}$ are two matrices such that the product AB is null matrix, then $\alpha - \beta$ is

A. 0

B. multiple of π

C. an odd multiple of $\pi/2$

D. None of these

Answer: C

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13. If A is a square matrix of order $n \times n$ then adj(adj A) is equal to

A. $|A|^n A$

B. $|A|^{n-1} A$

C. $|A|^{n-2} A$

D. $|A|^{n-3} A$

Answer: D

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14. If the vectors $\vec{a} + \lambda \vec{b} + 3\vec{c}$, $-2\vec{a} + 3\vec{b} - 4\vec{c}$ and $\vec{a} - 3\vec{b} + 5\vec{c}$ are coplanar, then the value of λ is

A. 2

B. -1

C. 1

D. -2

Answer: D

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15. If $\vec{a} + \vec{b} + \vec{c} = \vec{0}, |\vec{a}| = 3, |\vec{b}| = 5, |\vec{c}| = 7,$ then angle between $\vec{a}$ and $\vec{b}$ is

A. $\pi/6$

B. $2\pi/3$

C. $5\pi/3$

D. $\pi/3$

Answer: B

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16. A line is drawn through a fixed point $P(\alpha, B)$ to cut the circle $x^2 + y^2 = r^2$ at A and B. Then PA.PB is equal to

A. $(\alpha + \beta)^2 - r^2$

B. $(\alpha^2 + \beta^2 - r^2$

C. $(\alpha - \beta)^2 + r^2$

D. None of the above

Answer: B

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17. If the points (2, 0), (0, 1), (4, 5)and (0, c) are concyclic, then the value of c, is

A. 1

B. $\frac{14}{3}$

C. 5

D. None of these

Answer: D

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18. Two dice are rolled one after the other.The probability that the number on the first dice is smaller than that of the number on second dice is-

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

B. $\frac{7}{18}$

C. $\frac{3}{4}$

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

Answer: B

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19. The odds against a certain event are 5: 2 and the odds in favour of another independent event are 6:5. The probability that at least one of the events will happen, is

A. $\frac{25}{77}$

B. $\frac{52}{77}$

C. $\frac{12}{77}$

D. $\frac{65}{77}$

Answer: C

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20. If $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ bisect angles between each other, then find the condition.

A. p+q=1

B. pq=1

C. pq+1=0

D. $p^2 + pq + q^2 = 0$

Answer: C

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21. The circumcentre of the triangle formed by the lines, $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is-

A. (0,0)

B. (-2,-2)

C. (-1,-1)

D. (-1,-2)

Answer: A

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22. The value of $\lim_{x \to \infty} \left(\frac{x^2 - 2x + 1}{x^2 - 4x + 2} \right)$ is

A. e^2

B. e^{-2}

C. e^6

D. None of these

Answer: B

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23. If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ then $f(x)$ is differentiable on

A. [-1,1]

B. R-{-1,1}

C. R-(-1,1)

D. None of these

Answer: A

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24. The function $f(x) = e^{-|x|}$ is

A. continuous and differentiable everywhere not continuous at x=0

B.

C.

D. None of the above

Answer: A

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25. For the system of equaltions :

$x + 2y + 3z = 1$

$2x + y + 3z = 2$

$5x + 5y + 9z = 4$

A. there is only one solution

B. there exists infinitely many solution

C. there is no solution

D. None of the above

Answer: A

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26. A common tangent to $9x^2 - 16y^2 = 144$ and $x^2 + y^2 = 9$ is

A. $y = \frac{3}{\sqrt{7}}x + \frac{15}{7}$

B. $y = 3\sqrt{\frac{2}{7}}x + \frac{15}{7}$

C. $y = 2\sqrt{\frac{3}{7}}x + 15\sqrt{7}$

D. None of the above

Answer: B

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27. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide, then find the value

A. 1

B. 5

C. 7

D. 9

Answer: C

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28. If the vectors $\vec{a} = \hat{i} + a\hat{j} + a^2\hat{k}, \vec{b} = \hat{i} + b\hat{j} + b^2\hat{k}, \vec{c} = \hat{i} + c\hat{j} + c^2\hat{k}$ are three non-coplanar vectors and $+\left(a, a^2, 1 + a^3\right), \left(b, b^2, 1 + b^3\right), \left(c, c^2, 1 + c^3\right) \mid = 0$, then the value of abc is

A. 0

B. 1

C. 2

D. -1

Answer: D

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29. Let $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} - 2\hat{k}$ be three vectors. A vector in the plane of $\vec{b}$ and $\vec{c}$ whose projection on $\vec{a}$ is of magnitude $\sqrt{\frac{2}{3}}$, is

A. $2\hat{i} + 3\hat{j} - 3\hat{k}$

B. $2\hat{i} + 3\hat{j} + 3\hat{k}$

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

D. $2\hat{i} + \hat{j} + 5\hat{k}$

Answer: A

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30. If $y = \log_{\cos x} \sin x$, then $\frac{dy}{dx}$ is equal to

A. $\frac{\cot x \log \cos x + \tan x \log \sin x}{(\log \cos x)^2}$

B. $\frac{\tan x \log \cos x + \cot x \log \sin x}{(\log \cos x)^2}$

C. $\frac{(\cot x \log x + \tan x \log \sin x)}{(\log \sin x)^2}$

D. None of these

Answer: A

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31. If $y^2 = ax^2 + bx + c$, where a,b,c, are constants , then $y^3 \frac{d^2y}{dx^2}$ is equal to

A. constants, then y

B. a constant

C. a function of x

D. a function of y a function of x and y both

Answer: A

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32. If the constant forces $2\hat{i} - 5\hat{j} + 6\hat{k}$ and $-\hat{i} + 2\hat{j} - \hat{k}$ act on a particle due to which it is displaced from a point A (4,-3,-2) to a point B (6,1,-3), then the work done by the forces is

A. 15 unit

B. 9 unit

C. -15unit

D. -9unit

Answer: C

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33. Three letters, to each of which corresponds an envelope, are placed in the envelopes at random. The probability that all the letters are not placed in the right envelopes, is

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

B. $\frac{5}{6}$

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

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

Answer: B

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34. Which of the term is not used in a linear programming problem ?

A. Optimal solution

B. Feasible solution

C. Concave region

D. Objective function

Answer: C

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35. $\int \cos^3 x . e^{\log(\sin x)}$ dx is equal to

A. $-\frac{\sin^4 x}{4} + c$

B. $-\frac{\cos^4 x}{4} + c$

C. $-\frac{e \sin^4 x}{4} + c$

D. None of these

Answer: B

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36. The value of $\int_0^{\pi/2} \frac{\cos 3x + 1}{2\cos x - 1} dx$ is

A. 2

B. 1

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

D. 0

Answer: B

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37. The value of $\int 01 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$ is (A) 1 (B) 0 (C) -1 (D) $\frac{\pi}{4}$

A. 1

B. 0

C. -1

D. None of these

Answer: B

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38. If the function $f(x) = 2x^3 - 9ax^2 + 12x^2x + 1, wherea > 0,$ attains its maximum and minimum at $pandq$, respectively, such that $p^2 = q,$ then a equal to 1 (b) 2 (c) $\frac{1}{2}$ (d) 3

A. 0

B. 1

C. 2

D. None of these

Answer: C

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39. In the interval $[0, 1],$ the function $x^{25}(1 - x)^{75}$ takes its maximum value at the point 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

A. 0

B. $1/4$

C. $1/2$

D. $1/3$

Answer: B

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40. The constraints $-x_1 + x_2 < 1, \ -x_1 + 3x_2 \leq 9, x_1, x_2 > , 0$ difines on

A. bounded feasible space

B. unbounded feasible space

C. both bounded and unbounded feasible space

D. None of these

Answer: B

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41. By the application of Simpson's one-third rule numerical integration, subintervals, the value of $\int_0^1 \frac{dx}{1x} is$

A. $\frac{17}{36}$

B. $\frac{17}{25}$

C. $\frac{25}{36}$

D. $\frac{17}{24}$

Answer: C

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42. The function $f(x) = \frac{\log(1+x)_{2x}}{2+x}$ is increasing on

A. $(0, \infty)$

B. $(-\infty, 0)$

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

D. None of these

Answer: A

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43. If f(x)= kx-sin x is monotonically increasing then

A. $k > 1$

B. $k > -1$

C. $k < 1$

D. $k < -1$

Answer: A

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44. Which of the following statement has the truth value F ?

A. Aquadratic equation has always a real root

B. The number of ways of seating 2 persons in two chairs out of n persons in P (n, 2).

C. The cube roots of unity are in GP

D. None of the above

Answer: A

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45. The positive root of $x^2 - 78.8 = 0$ after first approximation by Newton Raphson method assuming initial approximation to the root is 14, is

A. 9.821

B. 9.814

C. 9.715

D. 9.915

Answer: B

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46. In the usual notation the value of ΔV is equal to

A. $\Delta - \nabla$

B. $\Delta + \nabla$

C. $\Delta - \nabla$

D. None of these

Answer: A

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47. The dual of the statement $[p \vee (-q) \vee (-p)$ is

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

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

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

D. None of these

Answer: D

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48. Maximum area of a reactangle which can be inscribed in a circle of a given radius R is

A. πr^2

B. r^2

C. $\pi r^2 / 4$

D. $2r^2$

Answer: D

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49. The set of points where the function $f(x) = |x-1|e^x$ is differentiable, is

A. R

B. $R - \{1\}$

C. R-{-1}

D. R-{0}

Answer: B

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50. If $x = \phi(t), y = \Psi(t), \quad \text{then} \quad \frac{d^2y}{dx^2}$ is equal to

A. $\frac{\phi'\Psi'' - \Psi'\phi'}{(\phi')^2}$

B. $\frac{\phi'\Psi'' - \Psi'\phi'}{(\phi')^3}$

C. $\frac{\phi''}{\Psi''}$

D. $\frac{\Psi''}{\phi'}$

Answer: B