MATHS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

QUESTION PAPER 2019(SOLVED)

Mathematics

1. Match the following

List I		List II
(A) $f: R \to R$ is such that $f(x) = px + q$, $(p \neq 0)$, $\forall\ x \in R$	I.	f is neither one-one nor onto
(B) $f: R \to R^+ \cup \{0\}$ is such that $f(x) = x^2$, $\forall\ x \in R$	II.	f is both one-one and onto
(C) $f: N \to N$ is such that $f(n) = n^2 + 2n + 3, \forall\ n \in N$	III.	f is one-one but not onto
(D) $f: R \to R$ is such that $f(x) = 2(\cos^2 5x + \sin^2 5x)$, $\forall\ x \in R$	IV.	f is onto but not one-one
	V.	f is a constant function and also a bijection

The correct answer is

A. A-II, B-IV, C - III, D - I

B. A-II, B-IV, C-V, D-I

C. A-II, B-I, C -III, D - V

D. A-III, B-II, C-I, D - IV

Answer: A

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2. The range of $f(x)=\sqrt{\dfrac{a-|x|}{(a+1)-|x|}},\ (a>0)$ is

A. [0, a]

B. $[0,\infty)-\left[-\sqrt{\dfrac{a}{a+1}},\sqrt{\dfrac{a}{a+1}}\right]$

C. $\left[0,\sqrt{\dfrac{a}{a+1}}\right]\cup(1,\infty),$

D. $\left[0,\sqrt{\dfrac{a}{a+1}}+1\right]$

Answer: C

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3. If $2.4^{2k+1} + 3^{3k+1} = 11t$ and $2.4^{2k+3} + 3^{3k+4} = 11(pt + 3^q)$, where $k, t \in Z^+$, then (p, q) =

A. (16, 3k +1)

B. (16, 3k + 4)

C. (32, 3k +1)

D. (32, 3k + 4)

Answer: A

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4. The equation obtained by eliminating a, b, c from the equations $x = \frac{a}{b-c}, y = \frac{b}{c-a}, z = \frac{c}{a-b}$ is

A. $\begin{vmatrix} 1 & -x & x \\ 1 & -y & y \\ 1 & -z & z \end{vmatrix} = 0$

B. $\begin{vmatrix} 1 & -x & x \\ 1 & 1 & -y \\ 1 & z & 1 \end{vmatrix} = 0$

C. $\begin{vmatrix} 1 & -x & x \\ y & 1 & -y \\ -z & z & -1 \end{vmatrix} = 0$

D. $\begin{vmatrix} x & y & 1 \\ y & x & 1 \\ 1 & x & y \end{vmatrix} = 0$

Answer: B

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5. If A is a 3×3 matrix and $|A| = 2$, then $|Adj(AdjA)|Adj(AdjA)$ =

A. $32A$

B. $64A$

C. $16A$

D. $8A$

Answer: A

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6. If $x=\alpha, y=\beta, z=\gamma$ is the solution, for the system of equations

$2x-y+8z=13$

$3x+4y+5z=18$

$5x-2y+7z=20$

then $\alpha\beta+\beta\gamma+\gamma\alpha=$

A. 1

B. 0

C. 7

D. -3

Answer: C

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7. For a complex number Z = a ib, let $\widehat{Z} = b + ia$. If Z_1, Z_2 are such complex numbers, then $\widehat{Z_1 Z_2}$ =

A. $\widehat{Z}_1 \widehat{Z}_2$

B. $\widehat{Z}_1 \widehat{\overline{Z}}_2$

C. $\overline{Z}_1 \widehat{Z}_2$

D. $\widehat{Z}_1 Z_2$

Answer: C

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8. The points in the argand plane represented by the complex conjugates of

$1 + 2i, 2 - 3i, 3 - 4i$

A. are collinear

B. form an equilateral triangle

C. form an obtuse angled triangle

D. form an acute angled triangle

Answer: C

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9. If $1, \alpha_1, \alpha_2, \ldots\ldots \alpha_{n-1}$ are the n^{th} roots of unity and n is an odd natural number then

$(1+\alpha_1)(1+\alpha_2)\ldots\ldots(1+\alpha_{n-1}) =$

A. 1

B. -1

C. 0

D. 2

Answer: C

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10. If $x+\frac{1}{x}=2\sin\alpha$ and $y+\frac{1}{y}=2\cos\beta$, then $x^3y^3+\frac{1}{x^3y^3}=$

A. $2\cos 3(\beta - \alpha)$

B. $2\cos 3(\beta + \alpha)$

C. $2\sin 3(\beta - \alpha)$

D. $2\sin 3(\beta + \alpha)$

Answer: C

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11. IF the product of the roots of the equation $x^2 + 4kx + 12e^{3\log k} - I = 0, (K > 0)$ is 323, then the sum of its roots is

A. 9k

B. 12

C. -12

D. $-16k$

Answer: C

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12. If a and b are the maximum and minimum values of the quadratic expressions $1-2x-5x^2$ and x^2-2x+5 respectively, then the set of all values of x for which the expression $5ax^2+bx+7$ is positive, is

A. (a, b)

B. $(-\infty, 7)$

C. $(5, \infty)$

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

Answer: D

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13. If $\left|\frac{x^2+kx+1}{x^2+x+1}\right| < 3$ for real x, then k is in the interval

A. (0, 4)

B. (-1, 5)

C. (-4, 0)

D. (-5, 1)

Answer: B

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14. Let $a, b, c, d \in R$. If the equations $2bx^2 + 3cx - d = 0$ and $2ax^2 + 3bx + 4c = 0$ have a common root and $\frac{4bc + ad}{k(b^2 - ac)} = \frac{bd + 4c^2}{4bc + ad}$, then k =

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

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

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

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

Answer: A

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15. If all the letters of the word REPEAT are permuted in all possible ways and if the six letter permutations thus formed are arranged in the dictionary order, then the rank of the word REPEAT is

A. 133

B. 267

C. 266

D. 132

Answer: B

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16. 15 persons are sitting around circular table. The number of ways of selectring three persons at a time from them, such that the selected three did not sit together at one place is

A. 455

B. 15

C. 45

D. 440

Answer: D

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17. If the coefficients of rth and (r+1)th terms in the expansion of $(1+x)^{24}$ are in the ratio 12 : 13, then r is the root of the quadratic equation

A. $x^2-5x+6=0$

B. $x^2-11x+30=0$

C. $x^2-14x+13=0$

D. $x^2-14x+24=0$

Answer: D

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18. If $x = \frac{2}{5} + \frac{1.3}{2!}\left(\frac{2}{5}\right)^2 + \frac{1.3.5}{3!}\left(\frac{2}{5}\right)^3 + \ldots,$ then $x + \frac{1}{x} =$

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

B. 3

C. $\frac{5\sqrt{5}+3}{4}$

D. $\frac{5\sqrt{5}-3}{4}$

Answer: D

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19. The coefficient of x^4 in the expansion of $\frac{1}{(1-x)(1-2x)(1-3x)}$ is

A. 602

B. 301

C. $\frac{601}{2}$

D. 302

Answer: B

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20. If tan A - tan B = x and cot A - cot B = y, then cot(A- B) =

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

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

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

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

Answer: D

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21. $\tan\frac{\pi}{5}+2\tan\frac{2\pi}{5}+4\cot\frac{4\pi}{5}=$

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

B. $\cot.\ \frac{2\pi}{5}$

C. $\cot.\ \frac{3\pi}{5}$

D. $\cot.\ \frac{4\pi}{5}$

Answer: A

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22. If $\sin x + \sin y = \dfrac{\sqrt{3}+1}{2}$ and $\cos x + \cos y = \dfrac{\sqrt{3}-1}{2}$, then $\tan^2\left(\dfrac{x-y}{2}\right) + \tan^2\left(\dfrac{x+y}{2}\right) =$

A. $8 + 4\sqrt{3}$

B. $6 + 4\sqrt{3}$

C. $3 + \sqrt{3}$

D. $12 + 6\sqrt{3}$

Answer: A

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23. The pair of lines $lx^2 + 2(l+m)xy + my^2 = 0$ lies along two diameters of a circle and divides the circle into 4 sectors. If the area of bigger sector is 5 times the area of smaller sector, then $\frac{lm}{(l+m)^2} =$

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

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

C. $\frac{11}{12}$

D. $\frac{13}{12}$

Answer: C

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24. The line 3x + 4y - 5 = 0 cuts the curve $2x^2 + 3y^2 = 5$ at A and B. if 'O' is the origin, then $\angle AOB$ =

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

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

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

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

Answer: C

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25. The centre of the circle which passes through the vertices of the triangle formed by the lines $y=0, y=x$ and $2x+3y=10$, is

A. $\left(-\frac{5}{2}, -\frac{1}{2}\right)$

B. $\left(\frac{5}{2}, -\frac{1}{2}\right)$

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

D. $\left(\frac{5}{2}, -\frac{1}{2}\right)$

Answer: B

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26. Find the polar of the point (−2,3) with respect to the circle

x2+y2−4x−6y+5=0

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27. A circle S of radius 2 units lies in the first quadrant and touches both the coordinate axes. The equation of the circle with centre at (6, 5) and touching the circle S externally is

A. $x^2 + y^2 - 12x - 10y + 12 = 0$

B. $x^2 + y^2 - 12x - 10y - 12 = 0$

C. $x^2 + y^2 - 12x - 10y + 25 = 0$

D. $x^2 + y^2 - 12x - 10y + 52 = 0$

Answer: D

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28. If the circles $(x+a)^2 + (y+b)^2 = a^2$ and $(x+c)^2 + (y+d)^2 = d^2$ cut orthogonally, then b(b-2d) =

A. c(c - 2a)

B. c(2a - c)

C. d(2c - a)

D. a(a-2c)

Answer: B

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29. The equation of the circle having the common chord of the circles $x^2+y^2-8x=0$ and $x^2+y^2-9=0$ as its diameter is

A. $x^2+y^2-72x-207=0$

B. $x^2+y^2+72x+207=0$

C. $32x^2+32y^2-72x-207=0$

D. $32x^2+32y^2+72x-207=0$

Answer: C

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30. The parametric equations of the parabola $y^2-8x-4y-12=0$ are

A. $x = 2 + 2t^2, y = -2 + 4t$

B. $x = 2 + 4t, y = -2 + 2t^2$

C. $x = -2 + 2t^2, y = 2 + 4t$

D. $x = -2 + 4t, y = -2 + 2t^2$

Answer: C

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31. For any non-zero real value of m, the equation of the parabola to which the line $mx - y + 10 + m^2 = 0$ is a tangent, is

A. $x^2 = y - 10$

B. $y^2 = 4(x - 2)$

C. $x^2 = -4(y - 10)$

D. $x^2 = -4y$

Answer: C

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32. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (b > a)$ and the parabola $y^2 = 4ax$ cut at right angles. If e is the eccentricity of the ellipse, then $2e^2$ =

A. A 1

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

C. C $\frac{1}{8}$

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

Answer: A

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33. Angle between the tangents drawn from the point (5,4) to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is

A. (5, 4)

B. (4, 5)

C. (0, 0)

D. (0, 5)

Answer: C

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34. If the normals drawn to the hyperbola xy = 4 at $(\alpha_i, \beta_i)(i = 1, 2, 3, 4)$ are concurrent at the point (a, b), then

$$\frac{(\alpha_1+\alpha_2+\alpha_3+\alpha_4)}{(\beta_1+\beta_2+\beta_3+\beta_4)}(\alpha_1\alpha_2\alpha_3\alpha_4) =$$

A. $\frac{-16b}{a}$

B. $\frac{-16a}{b}$

C. $\frac{4b}{a}$

D. $\frac{4a}{b}$

Answer: B

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35. The distance between the circumcentre and the orthocentre of the triangle formed by (1,2,3),(3,-1,5),(4,0,-3) is

A. $\sqrt{\frac{33}{2}}$

B. $\sqrt{\frac{31}{2}}$

C. $\sqrt{\frac{27}{2}}$

D. $\sqrt{\frac{23}{2}}$

Answer: A

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36. The direction cosines of the normal drawn to the plane passing through the points (2, -1, 5), (1, -3, 4), (5, 2, 1) are

A. $\frac{11}{\sqrt{179}}, \frac{-7}{\sqrt{179}}, \frac{3}{\sqrt{179}}$

B. $\frac{9}{\sqrt{134}}, \frac{-7}{\sqrt{134}}, \frac{2}{\sqrt{134}}$

C. $\frac{11}{\sqrt{179}}, \frac{7}{\sqrt{179}}, \frac{-3}{\sqrt{179}}$

D. $\frac{9}{\sqrt{134}}, \frac{-7}{\sqrt{134}}, \frac{-2}{\sqrt{134}}$

Answer: A

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37. The equation of the plane π through the line of intersection of the planes $\pi_1 \equiv x + 3y - 6 = 0$ and $\pi_2 \equiv 3x - y + 4z = 0$ is $\pi_1 + \lambda \pi_2 = 0$. If the plane π is at unit distance from the origin, then an equation of the plane π is

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

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

C. $2x + y + 2z + 3 = 0$

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

Answer: A

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38. Let [x] denote the greatest integer not exceeding x. If

$l_1 = \lim_{x \to 2^+} \left(x^2 + [x]\right), l_2 = \lim_{x \to 2^+} (2x - [x])$ and

$l_3 = \lim_{x \to \frac{\pi}{2}} \left(\frac{\cos x}{x - \frac{\pi}{2}}\right)$, then

A. $l_2 < l_3 < l_1$

B. $l_1 < l_3 < l_2$

C. $l_1 < l_2 < l_3$

D. $l_3 < l_2 < l_1$

Answer: D

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39. If $\lim_{x \to 0} \frac{[(a-n)nx - \tan x] \sin nx}{x^2} = 0, (n \neq 0)$ then the minimum possible positive value of a is

A. 0

B. -2

C. 2

D. 1

Answer: C

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40. If a function f is defined by :

f(x) = 0, when x = 1,

$= x^3 - 1, \text{ when } 1 < x < \infty, \ = x - 1, \text{ when } -\infty < x < 1,$

then at x = 1, f is

A. continuous and differentiable

B. continuous but not differentiable

C. discontinuous and differentiable

D. discontinuous and not differentiable

Answer: B

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41. If $\cos(f(x)) = \frac{1-x^2}{1+x^2}$ and $\tan(g(x)) = \frac{3x-x^3}{1-3x^2}$, then $\frac{df}{dg}$ =

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

B. $\frac{1+x^2+2x^3}{(1-3x^2)^2}$

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

D. $\frac{x^2+x^3}{(1+x^2)(1-3x^2)}$

Answer: C

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42. If $x^2 + y^2 = t - \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $\frac{dy}{dx}$ =

A. $\frac{2}{x^3}$

B. $\frac{2}{x^3 y}$

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

D. $\frac{1}{x^3 y}$

Answer: D

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43. If $x = \sin\theta$ and $y = \cos p\theta$, then $(1 - x^2) y_2 =$

A. $x y_1 - p^2 y$

B. $p^2 y - x y_1$

C. $x y_1$

D. $p^2 y$

Answer: A

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44. If T is the length of the subtangent drawn at any point on the curve $3y^2 = 4x^3$ and N is the length of the subnormal at the same point, the $(3T)^2$ =

A. $4N^2$

B. 4N

C. 2N

D. $8N^2$

Answer: C

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45. The interval in which the function $f(x)=\frac{\log(7+x)}{\log(3+x)}(x>0)$ decreases is

A. $\left(0, \frac{7}{3}\right)$

B. $\left(0, \frac{3}{7}\right)$

C. (0, 1)

D. $(0, \infty)$

Answer: D

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46. Let f be a polynormal function defined on [2, 7]. If f(2) = 3 and $f'(x) = \leq 5$ for all x in (2, 7), then the maximum possible value attained by f at x = 7 is

A. 7

B. 14

C. 18

D. 28

Answer: D

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47. In the interval [-2, 4], the absolute maximum of $f(x) = 2x^3 - 3x^2 - 12x + 5$ occurs x =

A. A 4

B. B -2

C. C -1

D. D 2

Answer: A

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48. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = k \cos 4x + c$, then k is

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

B. $-\frac{1}{4}$

C. $-\frac{1}{8}$

D. -1

Answer: C

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49. $\int e^{2x}\left[\cos(3x+4)+5x^2\right]dx =$

A.

$$e^{2x}\left[\frac{2}{13}\cos(3x+4)+\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$$

B.

$$e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$$

C.

$$e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)-\frac{5x^2}{2}-\frac{5x}{2}-\frac{5}{4}\right]$$

D.

$$e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$$

Answer: A

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50.

$$\int \frac{5\cot x+1}{(\cot x-1)(\cot x-2)\sin^2 x}dx = 6\log|f(x)|+11\log|g(x)|+c$$

, then (f(x), g(x)) =

A. $(\cot, x-1), (\cot x-2)^{-1})$

B. $\left((\cot x-1)^{-1}, \cot x-2\right)$

C. $\left((\cot x-1)^{-1}, (\cot x-2)^{-1}\right)$

D. $(\cot x-1, \cot x+2)$

Answer: A

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51. If $I_{mc}=\int e^{mx}.\,X^n dx$, then $I_{mn}+\frac{n}{m}I_{m,n-1}=$

A. $x^{n}.\,e^{mx}+c$

B. $\dfrac{X^{n}e^{mx}}{n}+C$

C. $\dfrac{X^{n}.\,e^{mx}}{m}+C$

D. $\dfrac{-X^{n}.\,e^{mx}}{m}+C$

Answer: C

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52. $\lim_{n\to\infty}\dfrac{1}{n}[(n+1)(n+2)\ldots(2n)]^{\frac{1}{n}}=$

A. 1

B. 0

C. $\dfrac{2}{e}$

D. $\dfrac{4}{e}$

Answer: D

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53. $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx =$

A. $\frac{3}{\sqrt{2}}\log\left(\sqrt{2}+1\right)^{\frac{1}{2}}$

B. $\frac{1}{\sqrt{2}}\log\left(\sqrt{2}+1\right)$

C. $\frac{\sqrt{2}}{3}\log\left(\sqrt{3}+1\right)$

D. $\frac{\sqrt{2}}{3}\log\left(\sqrt{2}-1\right)$

Answer: B

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54. The area (in sq units) enclosed by the loop of the curve $ay^2 = x^2(a - x), (a < 0)$ is

A. $2\pi a^2$

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

C. $\frac{4}{15}a^2$

D. $\frac{8}{15}a^2$

Answer: D

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55. The different equation corresponding to the finally of curves $y = e^x(A\cos x + B\sin x)$ is

A. $y'' + y' + y = 0$

B. $y'' + 2y' + 2y = 0$

C. $y'' - 2y' + 2y = 0$

D. $y'' - 2y' - 2y = 0$

Answer: C

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56. The solution of the differential equation $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$ is (Here, k is an arbitrary constant)

A. $x = y\sin^{-1}\left(\frac{k}{x}\right)$

B. $y = x\sin^{-1}\left(\frac{k}{x}\right)$

C. $x\sin y + k = 0$

D. $y = x\cos(kx)$

Answer: B

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