MATHS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

QUESTION PAPER 2015

Mathematics

1. If $f: R \to R, g: R \to R$ are defined by $f(x) = 5x - 3, g(x) = x^2 + 3$, then $(gof^{-1})(3) =$

A. $\frac{25}{3}$

B. $\frac{111}{25}$

C. $\frac{9}{25}$

D. $\frac{25}{111}$

Answer: B

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2. If $A=\left\{x \in R / \frac{\pi}{4} \leq x \leq \frac{\pi}{3}\right\}$ and f(x)=sinx-x, then f(A) is equal to

A. $\left[\frac{\sqrt{3}}{2}-\frac{\pi}{3}, \frac{1}{\sqrt{2}}-\frac{\pi}{4}\right]$

B. $\left[\frac{-1}{\sqrt{2}}-\frac{\pi}{4}, \frac{\sqrt{3}}{2}-\frac{\pi}{3}\right]$

C. $\left[-\frac{\pi}{3}, -\frac{\pi}{4}\right]$

D. $\left[\frac{\pi}{4}, \frac{\pi}{3}\right]$

Answer: A

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3. The value of the sum 1.2.3+2.3.4+3.4.5+... upto n terms is equal to

A. $\frac{1}{6}n^2\left(2n^2+1\right)$

B. $\frac{1}{6}\left(n^2-1\right)(2n-1)(2n+3)$

C. $\frac{1}{8}\left(n^2+1\right)\left(n^2+5\right)$

D. $\frac{1}{4}n(n+1)(n+2)(n+3)$

Answer: D

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4. $\begin{vmatrix} b^2-ab & b-c & bc-ac \\ ab-a^2 & a-b & b^2-ab \\ bc-ac & c-a & ab-a^2 \end{vmatrix} =$

A. abc

B. a+b+c

C. 0

D. ab+bc+ca

Answer: C

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5. If A is square matric of order 3, then $\left|Adj\left(AdjA^2\right)\right| =$

A. $|A|^2$

B. $|A|^4$

C. $|A|^8$

D. $|A|^{16}$

Answer: C

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6. The system 2x+3y+z=5, 3x+y+5z=7 and x+4y-2z=3 has

A. unique solution

B. finite number of solution

C. infinite solutions

D. no solution

Answer: D

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7. $\sum_{k=1}^{6}\left[\sin\frac{2k\pi}{7}-i\cos\frac{2k\pi}{7}\right]$ is equal to

A. -1

B. 0

C. $-i$

D. i

Answer: D

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8. If ω is a complex cube root of unity then $\omega^{\left(\frac{1}{3}+\frac{2}{9}+\frac{4}{27}+\ldots.\infty\right)}+\omega^{\left(\frac{1}{2}+\frac{3}{8}+\frac{9}{32}+\ldots\infty\right)}=$

A. 1

B. -1

C. ω

D. i

Answer: B

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9. The common roots of the equations $z^3 + 2z^2 + 2z + 1 = 0, \ z^{2014} + z^{2015} + 1 = 0$ are

A. ω, ω^2

B. $1, \omega, \omega^2$

C. $-1, \omega, \omega^2$

D. $-\omega, \ -\omega^2$

Answer: A

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10. If a,b,c are distinct and the roots of $(b-c)x^2+(c-a)x+(a-b)=0$ are equal, then a,b and c are in

A. arithmetic progression

B. geometric progression

C. harmonic progression

D. arithmetic-geometric progression

Answer: A

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11. If the roots of $x^3-kx^2+14x-8=0$ are in G.P. then k =

A. -3

B. 7

C. 4

D. 0

Answer: B

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12. IF the harmonic mean of the roots of $\sqrt{2}x^2 - bx + \left(8 - 2\sqrt{5}\right) = 0$ is 4 then the value of b=

A. 2

B. 3

C. $4 - \sqrt{5}$

D. $4 + \sqrt{5}$

Answer: C

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13. For real value of x, the range of $\dfrac{x^2+2x+1}{x^2+2x-1}$ is

A. $(-\infty, 0)\cup(1,\infty)$

B. $\left[\dfrac{1}{2}, 2\right]$

C. $\left(-\infty, \dfrac{-2}{9}\right]\cup(1,\infty)$

D. $(-\infty, -6)\cup(-2,\infty)$

Answer: A

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14. T_m denotes the number of triangles that can be formed with the vertices of a regular polygon of m sides . If $T_{m+1}-T_m=15$ then m=

A. 3

B. 6

C. 9

D. 12

Answer: B

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15. If |x|<1, then the coefficient of x^5 in the expansion of $\frac{3x}{(x-2)(x+1)}$ is

A. $\frac{33}{32}$

B. $\frac{-33}{32}$

C. $\frac{31}{32}$

D. $\frac{-31}{32}$

Answer: B

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16. If the coefficients of x^9, x^{10}, x^{11} in the expansion of $(1+x)^n$ are in arithmetic progression then $n^2 = 41n =$

A. 399

B. 298

C. -398

D. 198

Answer: C

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17. If $\sin\theta + \cos\theta = p \text{and} \tan\theta + \cot\theta = q, \text{then} q(p^2 - 1)$ is equal to

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

B. 2

C. 1

D. 3

Answer: B

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

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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19. If sinA+sinB+sinC=0

and cosA+cosB+cosC=0,

then cos(A+B)+cos(B+C)+cos(C+A) is equal to

A. Option1 (A+B+C)

B. Option2 2

C. Option3 1

D. Option4 0

Answer: D

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20. If $\tan\theta.\tan(120^\circ - \theta)\tan(120^\circ + \theta) = \frac{1}{\sqrt{3}}$ then θ =

A. $\frac{n\pi}{3} + \frac{\pi}{18}, n \in Z$

B. $\frac{n\pi}{3} + \frac{\pi}{12}, n \in Z$

C. $\frac{n\pi}{12} + \frac{\pi}{12}, n \in Z$

D. $\frac{n\pi}{3} + \frac{\pi}{6}, n \in Z$

Answer: A

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21. If

$$\sin^{-1}\left(x-\frac{x^2}{2}+\frac{x^3}{4}-\ldots\infty\right)+\cos^{-1}\left(x^2-\frac{x^4}{2}+\frac{x^6}{4}-\ldots\infty\right)=\frac{\pi}{2}$$

and

$0 < x < \sqrt{2}$, then x is equal to

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

B. 1

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

D. -1

Answer: B

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22. If $2\sinh^{-1}\left(\frac{a}{\sqrt{1-a^2}}\right)=\log\left(\frac{1+x}{1-x}\right)$, then x =

A. a

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

C. $\sqrt{1-a^2}$

D. $\dfrac{1}{\sqrt{1-a^2}}$

Answer: A

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23. If in a $\Delta ABC, r_1 = 2r_2 = 3r_3$, then the perimeter of the triangle is equal to

A. 3a

B. 3b

C. 3c

D. 3(a+b+c)

Answer: B

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24. If $M_1, M_2, M_3 \text{and} M_4$, are respectively the magnitudes of the vectors

$a_1 = 2\hat{i} - \hat{j} + \hat{k}, a_2 = -3\hat{i} - 4\hat{j} - 4\hat{k}, a_3 = -\hat{i} + \hat{j} - \hat{k}, a_4 = -\hat{i} + 3$

, then the correct order of $M_1, M_2, M_3 \text{and} M_4$ is

A. $M_3 < M_1 < M_4 < M_2$

B. $M_3 < M_1 < M_2 < M_4$

C. $M_3 < M_4 < M_1 < M_2$

D. $M_3 < M_4 < M_2 < M_1$

Answer: A

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25. If a,b,c are unit vectors such that a + b + c = 0 then a.b + b.c + c + c . A=

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

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

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

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

Answer: B

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26. If $a = 2\hat{i} + \hat{k}, b = \hat{i} + \hat{j} + \hat{k}, c = 4\hat{i} - 3\hat{j} + 7\hat{k},$ then the vector r satisfying $r \times b = c \times b$ and r.a=0 is

A. $\hat{i} + 8\hat{j} + 2\hat{k}$

B. $\hat{i} - 8\hat{j} + 2\hat{k}$

C. $\hat{i} - 8\hat{j} - 2\hat{k}$

D. $-\hat{i} - 8\hat{j} + 2\hat{k}$

Answer: D

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27. If a,b and c are three vectors such that |a|=1, |b|=2, |c|=3 and a.b=b.c=c.a=0, then |[a b c]| is equal to

A. 2

B. 3

C. 4

D. 6

Answer: D

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28. If $[a \times bb \times cc \times a]\lambda[abc]^2$ then λ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

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29. The cartesion equation of th plane passing through the point (3,-2,-1) and parallel to the vectors $b = \hat{i} - 2\hat{j} + 4\hat{k} \text{and} c = 3\hat{i} + 2\hat{j} - 5\hat{k}$ is

A. 2x-17y-8z+63=0

B. 3x+17y+8z=36=0

C. 2x+17y+8z+36=0

D. 3x-16y+8z-63=0

Answer: C

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30. The arithmetic mean of the observations 10,8,5,a,b is 6 and their variance is 6.8, then ab is equal to

A. 6

B. 4

C. 3

D. 12

Answer: D

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31. If the median of the data 6, 7, x-2, x, 18, 21 written in ascending order is 16, then the variance of that data is

A. $30\frac{1}{5}$

B. $31\frac{1}{3}$

C. $32\frac{1}{2}$

D. $33\frac{1}{3}$

Answer: B

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32. Two persons A and B are rolling die on the condition that the person who gets 3 will win the game. If A starts the game, then find the probabilities of A and B respectively to win the game.

A. $\frac{6}{11}, \frac{5}{11}$

B. $\frac{5}{11}, \frac{6}{11}$

C. $\frac{8}{11}, \frac{3}{11}$

D. $\frac{3}{11}, \frac{8}{11}$

Answer: C

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33. The letters of the word 'QUESTION' are arranged in a row at random. The probability that there are exactly two letters between Q and S is

A. $\frac{1}{14}$

B. $\frac{5}{7}$

C. $\frac{1}{7}$

D. $\frac{5}{28}$

Answer: D

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34. If $\frac{1+3P}{3}, \frac{1-2P}{2}$ are probabilities of two mutually exclusive events, then P lies in the interval.

A. $\left[-\frac{1}{3}, \frac{1}{2}\right]$

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

C. $\left[-\frac{1}{3}, \frac{2}{3}\right]$

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

Answer: A

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35. The probability that an event does not happen in one trial is 0.8 The probability that the event happens atmost once in three trials is

A. 0.896

B. 0.791

C. 0.642

D. 0.592

Answer: A

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36. If the equation to the locus of points equidistant from the points (-2,3),(6,-5) is ax+by+c=0, where a>0, then the ascending order of a,b,c is

A. a,b,c

B. c,b,a

C. b,c,a

D. a,c,b

Answer: B

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37. The point (2,3) is first reflected in the straight line y=x and then translated through a distance of 2 units along the positive direction X-axis. The coordinates of the transformed point are

A. (5,4)

B. (2,3)

C. (5,2)

D. (4,5)

Answer: C

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38. If the staight lines 2x+3y-1=0,x+2y-1=0, and ax+by-1=0 from a triangle with the origin as orthocenter, then (a,b) is given by

A. (6,4)

B. (-3,3)

C. (-8,8)

D. (0,7)

Answer: C

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39. The point on the line 4x-y-2=0 which is equidistant from the points (-5,6) and (3,2) is

A. (2,6)

B. (4,14)

C. (1,2)

D. (3,10)

Answer: B

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40. If the lines x+2ay+a=0, x+3by+b=0, x+4cy+c=0 are concurrent, then a,b and c are in

A. arithmetic progression

B. geometric progression

C. harmonic progression

D. arithmetic-geometric progression

Answer: C

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41. If the slope of one of the lines represented by $ax^2 - 6xy + y^2 = 0$ is the square of the other, then the value of a is

A. $-27 \text{ or } 8$

B. $-3 \text{ or } 2$

C. $-64 \text{ or } 27$

D. $-4 \text{ or } 3$

Answer: A

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42. The sum of the minimum and maximum distances of the point (4,-3) to the circlex^2 +y^2+4x-10y-7=0

A. 10

B. 12

C. 16

D. 20

Answer: D

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43. The locus of centres of the circles, which cut the circles $x^2 + y^2 + 4x - 6y + 9 \text{and} x^2 + y^2 - 5x + 4y + 2 = 0$ orthogonally, is

A. 3x+4y-5=0

B. 9x-10y+7=0

C. 9x+10y-7=0

D. 9x-10y+11=0

Answer: B

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44. If $x-y+1=0$ meets the circle $x^2+y^2+y-1=0$ at A and B , then the equation of the circle with AB as diameter is

A. $2(x^2+y^2)+3x-y+1=0$

B. $2(x^2+y^2)+3x-y+2=0$

C. $2(x^2+y^2)+3x-y+3=0$

D. $x^2+y^2+3x-y+4=0$

Answer: A

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45. An equilateral triangle is inscribed in the parabola $y^2=8x$ with one of its vertices is the vertex of the parabola. Then, the length or the side or that triangle is

A. $24\sqrt{3}$ units

B. $16\sqrt{3}$ units

C. $8\sqrt{3}$ units

D. $4\sqrt{3}$ units

Answer: B

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46. The point (3,4) is the focus and 2x-3y+5=0 is the directrix of a parabola . Its latusrectum is

A. $\frac{2}{\sqrt{13}}$

B. $\frac{4}{\sqrt{13}}$

C. $\frac{1}{\sqrt{13}}$

D. $\frac{3}{\sqrt{13}}$

Answer: A

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47. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre at (0, 3) is

A. 6

B. 4

C. 3

D. 2

Answer: B

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48. The values that m can take so that the straight line $y = 4x + m$ touches the curve $x^2 + 4y^2 = 4$ is

A. $\pm\sqrt{45}$

B. $\pm\sqrt{60}$

C. $\pm\sqrt{65}$

D. $\pm\sqrt{72}$

Answer: C

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49. The foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and the hyperbla $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{25}$ coincide. Then, the value of b^2 is

A. 5

B. 7

C. 9

D. 1

Answer: B

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50. If (2,-1,2) and (K,3,5) are the triads of direction ratios of two lines and the angle between them is 45°, then the value of K is

A. 2

B. 3

C. 4

D. 6

Answer: C

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51. The length of perpendicular from the origin to the plane which makes intercepts $\frac{1}{3}, \frac{1}{4} \text{and} \frac{1}{5}$ respectively on the coordinate axes is

A. $\frac{1}{5\sqrt{2}}$

B. $\frac{1}{10}$

C. $5\sqrt{2}$

D. 5

Answer: A

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52. If $g(x) = \frac{x}{[x]}$ for x>2, then $\lim_{x \to 2} \frac{g(x) - g(2)}{x - 2}$ is equal to

A. -1

B. 0

C. $1/2$

D. 1

Answer: C

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53. $\lim_{x \to \frac{\pi}{2}} \left(\frac{2x - \pi}{\cos x}\right)$ is equal to

A. 0

B. $1/2$

C. -2

D. 5

Answer: C

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54. If f is defined by $f(x) = \begin{cases} x & \text{for } \ 0 \leq x < 1 \\ 2 - x & \text{for } \ x \leq 1 \end{cases}$ then at x =1

A. continuous and differentiable

B. continuous but not differentiable

C. discontinuous but differentiable

D. neither continuous nor differentiable

Answer: B

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55. If $x^2+y^2=t+\frac{1}{t}$ and $x^4+y^4=t^2+\frac{1}{t^2}$, then $\frac{dy}{dx}$ is equal to

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

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

C. $\frac{x^2}{y^2}$

D. $\frac{y^2}{x^2}$

Answer: B

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56. If $x=at^2$ and $y=2$ at, then $\frac{d^2y}{dx^2}$ at $t=\frac{1}{2}$ is

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

B. $\frac{4}{a}$

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

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

Answer: D

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57. The volume of a sphere is increasing at the rate of 1200 c.cm/sec. The rate of increase in its surface area when the radius is 10 cm is

A. 120 sq cm/s

B. 240 sq cm/s

C. 200 sq cm/s

D. 100 sq cm/s

Answer: B

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58. The slope of the tangent to the curve $y = \int_0^x \frac{1}{1+t^3} dt$ at the point, where x=1 is

A. $\frac{1}{4}$

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

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

D. 1

Answer: C

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59. If $x^2 + y^2 = 25$ then $\log_5[\max(3x + 4y)]$ is

A. 2

B. 3

C. 4

D. 5

Answer: A

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60. $\int \frac{dx}{(x-1)\sqrt{x^2-1}} =$

A. $-\sqrt{\frac{x-1}{x+1}}+C$

B. $\sqrt{\frac{x-1}{x^2+1}}+C$

C. $-\sqrt{\frac{x+1}{x-1}}+C$

D. $\sqrt{\frac{x^2+1}{x-1}}+C$

Answer: C

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61. $\int \frac{e^x(x^2+1)}{(1+x)^2}dx =$

A. $\dfrac{e^x}{x+1}+C$

B. $\dfrac{-e^x}{x+1}+C$

C. $e^x\left(\dfrac{x-1}{x+1}\right)+C$

D. $e^x\left(\dfrac{x+1}{x-1}\right)+C$

Answer: C

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62. $\displaystyle\int\frac{(x+1)dx}{x(1+xe^x)}=$

A. $\log\left|\dfrac{1+xe^x}{xe^x}\right|+C$

B. $\log\left|\dfrac{xe^x}{1+xe^x}\right|+C$

C. $\log|xe^x(1+xe^x)|+C$

D. $\log|1+xe^x|+C$

Answer: B

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63. $\int \frac{f(x)g'(x) - f'(x)g(x)}{f(x)g(x)}[\log(g(x)) - \log(f(x))]dx =$

A. $\log\left[\frac{g(x)}{f(x)}\right] + C$

B. $\frac{1}{2}\left[\log\frac{g(x)}{f(x)}\right]^2 + C$

C. $\frac{g(x)}{f(x)}\log\left[\frac{g(x)}{f(x)}\right] + C$

D. $\log\left[\frac{g(x)}{f(x)}\right] - \frac{g(x)}{f(x)} + C$

Answer: B

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64. $\int_0^{\pi/4} \frac{\sin x + \cos x}{3 + \sin 2x} dx =$

A. $\frac{1}{2}\log 3$

B. log2

C. log3

D. $\frac{1}{4}\log 3$

Answer: D

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65. $\int_{-1}^{1} \frac{\sqrt{1+x+x^2}-\sqrt{1-x+x^2}}{\sqrt{1+x+x^2}+\sqrt{1-x+x^2}} dx =$

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

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

C. 0

D. -1

Answer: C

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66. The area of the region described by $\{(x, y)/x^2 + y^2 \leq 1 \text{and} y^2 \leq 1 - x\}$ is

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

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

C. $\frac{\pi}{2} + \frac{4}{3}$

D. $\frac{\pi}{2} - \frac{4}{3}$

Answer: C

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67. The solution of $\frac{dy}{dx} + \frac{1}{x} = \frac{e^y}{x^2}$ is

A. $2x = (1 + Cx^2)e^y$

B. $x = (1 + Cx^2)e^y$

C. $2x^2 = (1 + Cx^2)e^{-y}$

D. $x^2 = (1 + Cx^2)e^{-y}$

Answer: A

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68. The differential equation $\frac{dy}{dx} = \frac{1}{ax + by + c}$ where a,b,c are all non zero real numbers, is

A. linear in y

B. linear in x

C. linear in both x and y

D. homogeneous equation

Answer: B

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69. $\left(\frac{1+\cos\frac{\pi}{8}-i\sin\frac{\pi}{8}}{1+\cos\frac{\pi}{8}+i\sin\frac{\pi}{8}}\right)^8$

A. 1

B. -1

C. 2

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

Answer: B

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70. The number of four-digit numbers formed by using the digits 0,2,4,5 and which are not divisible by 5, is

A. 10

B. 8

C. 6

D. 4

Answer: B

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71. If $x = \frac{1}{5} + \frac{1.3}{5.10} + \frac{1.3.5}{5.10.15} + \ldots . \infty$ then find $3x^2 + 6x$.

A. 1

B. 2

C. 3

D. 4

Answer: B

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72. In a ΔABC, $(a+b+c)(b+c-a) = \lambda bc$, then

A. $\lambda \leftarrow 6$

B. $\lambda > 6$

C. $0 < \lambda < 4$

D. $\lambda > 4$

Answer: C

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73. In a ΔABC, $\frac{a}{\tan A} + \frac{b}{\tan B} + \frac{C}{\tan C}$ is equal to

A. 2r

B. r+2R

C. 2r+R

D. 2(r+R)

Answer: D

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74. The angle between the straight lines represented b

$(x^2+y^2)\sin^2\alpha=(x\cos\alpha-y\sin\alpha)^2$ is

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

B. α

C. 2α

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

Answer: C

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75. The equation of the circle passing through (2, 0) and (0, 4) and having the minimum radius is

A. $x^2+y^2=20$

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

C. $x^2 + y^2 = 4$

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

Answer: B

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76. If $x^2 + y^2 - 4x - 2y + 5 = 0 \text{and} x^2 + y^2 - 6x - 4y - 3 = 0$ are members of a coaxial system of circles, then the centre of a point circle in the system is

A. (-5,-6)

B. (5,6)

C. (3,5)

D. (-8,-13)

Answer: A

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77. Let D be the domain of a twice differentiable function f. For all $x \in D$, $f''(x) + f(x) = 0 \text{and} f(x) = \int g(x)dx + \text{constant}.$ If $h(x) = \{f(x)\}^2 + \{g(x)\}^2$ and h(0)=5, then h(2015)-h(2014) is equal to

A. 5

B. 3

C. 0

D. 1

Answer: C

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78. If f is defined in [1,3] by $f(x) = x^3 + bx^2 + ax$ such that f(1)-f(3)=0 and $f'(c) = 0, \text{where} c = 2 + \frac{1}{\sqrt{3}}$, then (a,b) is equal to

A. (-6,11)

B. $\left(2-\frac{1}{\sqrt{3}}, 2+\frac{1}{\sqrt{3}}\right)$

C. (11,-6)

D. (6,11)

Answer: C

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