MATHS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

AP EAMCET ENGINEERING ENTRANCE EXAM ONLINE QUESTION PAPER 2019 (SOLVED)

Mathematics

1. $f(x) = \frac{x}{e^x - 1} + \frac{x}{2} + 2\frac{\cos^3 x}{2}$ on R-{0} is

A. one one function

B. bijection

C. algebraic function

D. even function

Answer: D

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2. Consider the following units

List I	List II
(A) $f(x) = \frac{\lvert x+2 \rvert}{x+2}, x \neq -2$	1. $\left[\frac{1}{3}, 1\right]$
(B) $g(x) = \lvert[x]\rvert, x \in R$	2. Z
(C) $h(x) = \lvert x - [x] \rvert, x \in R$	3. W
(D) $f(x) = \frac{1}{2 - \sin 3x}, x \in R$	4. $[0, 1)$
	5. $\{-1, 1\}$

A. 5 3 2 1

B. 3 2 4 1

C. 5 3 4 1

D. 1 2 3 4

Answer: C

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3. Assertion (A)

$(1) + (1 + 2 + 4) + (4 + 6 + 9) + (9 + 12 + 16) + \ldots\ldots + (81 + 90 + 10$

Reason (R) $\sum_{r=1}^{11}\left(r^3 - [r-1]^3\right) = n^3$ for any natural number n

A. Both (A) and (R) are true and (R) is the correct explanationn of (A)

B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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4. IF $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, P = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $X = APA^T$ then $A^T X^{50} A =$

A. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 25 & 1 \\ 1 & -25 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$

Answer: D

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5. IF [x] is the greatest integer less than or equal to x and IxI is the modulus of x, then the system of three equations

2x+3|y|+5[z]=0,x+|y|-2 [z]=4, z+|y|+[z]=1` has

A. a unique solution

B. finitely many solutions

C. infinitely many solutions

D. no solution

Answer: C

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6. Investigate the values of λ and μ for the system $x+2y+3z=6, x+3y+5z=9, 2x+5y+\lambda z=\mu$ and match the values in List-I with the terms in List -II

	List I	List II
(A)	$\lambda = 8, \mu \neq 15$	1. Infinitely many solutions
(B)	$\lambda \neq 8, \mu \in R$	2. No solution
(C)	$\lambda = 8, \mu = 15$	3. Unique solution

A. 1 2 3

B. 2 3 1

C. 3 1 2

D. 3 2 1

Answer: B

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7. IF $z=x+iy, x, y, \in R, (x, y) \neq (0, -4)$ and Arg $\left(\frac{2z-3}{z+4i}\right)=\frac{\pi}{4}$,

then the locus of z is

A. $2x^2+2y^2+5x+5y-12=0$

B. $2x^2-3xy+y^2+5x+y-12=0$

C. $2x^2+3xy+y^2+5x+y+12=0$

D. $2x^2+2y^2-11x+7y-12=0$

Answer: A

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8. IF $z=x+iy, x, y \in R$ and the imaginary part of $\left(\frac{\bar{z}-1}{\bar{z}-i}\right)$ is 1,then

the locus of z is

A. $x+y+1=0$

B. $x+y+1=0, (x, y) \neq (0, -1)$

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

D. $x^2 + y^2 - x + 3y + 2 = 0, (x, y) \neq (0, -1)$

Answer: D

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9. IF ω represents a complex cube root of unity, then $\left(1 + \frac{1}{\omega}\right)\left(1 + \frac{1}{\omega^2}\right) + \left(2 + \frac{1}{\omega}\right)\left(2 + \frac{1}{\omega^2}\right) + \dots + \left(n + \frac{1}{\omega}\right)\left(n + \frac{1}{\omega^2}\right)$

A. $\frac{n(n^2+1)}{3}$

B. $\frac{n(n^2+2)}{3}$

C. $\frac{n(n^2-2)}{3}$

D. $\frac{n^2(n-1)}{6}$

Answer: B

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10. IF ω is a complex cube root of unity

$$\sum_{r=1}^{9} r(r+1-\omega)\left(r+1-\omega^2\right) =$$

A. 5025

B. 4020

C. 2016

D. 3015

Answer: D

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11. IF α and β are the roots of $x^2+7x+3=0$ and $\frac{2\alpha}{3-4\alpha}, \frac{2\beta}{3-4\beta}$ are the roots of $ax^2+bx+c=0$ and GCD of a,b,c is 1, then a+b+c=

A. 11

B. 0

C. 243

D. 81

Answer: D

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12. IF α, β are the roots of $x^2 + bx + c = 0, \gamma, \delta$ are the roots of $x^2 + b_1x + c_1 = 0$ and $\gamma < \alpha < \delta < \beta$, then $(c - c_1)^2 <$

A. $(b_1 - b)(bc_1 - b_1c)$

B. 1

C. $(b - b_1)^2$

D. $(c - c_1)(b_1c - b_1c_1)$

Answer: A

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13. Let a,b and s be the sides of a scalane triangle. IF λ is a real number such that the roots of the equation $x^2 + 2(a+b+c)x + 3\lambda(ab+bc+ca) = 0$ are real, then the interval in which λ lies is

A. $\left(\infty, \frac{4}{3}\right)$

B. $\left(\frac{5}{3}, \infty\right)$

C. $\left(\frac{1}{3}, \frac{5}{3}\right)$

D. $\left(\frac{4}{3}, \infty\right)$

Answer: A

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14. The polynomial equation of degree 4 having real coefficients with three of its roots as $2 \pm \sqrt{3}$ and $1 + 2i$ is

A. $x^4 - 6x^3 - 14x^2 + 22x + 5 = 0$

B. $x^4 - 6x^3 - 19x + 22x - 5 = 0$

C. $x^4 - 6x^3 + 19x - 22x + 5 = 0$

D. $x^4 - 6x^3 + 14x^2 - 22x + 5 = 0$

Answer: D

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15. All the letters of the work ANIMAL are permuted in all possible ways and the permutations thus formed are arranged in dictionary order. IF the rank of the work ANIMAL is x, then the permutation with rank x, among the permutations obtained by permuting the letters of the word PERSON and arranging the permutations thus formed in dictionary order is

A. ENOPRS

B. NOSPRE

C. NOEPRS

D. ESORNP

Answer: D

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16. A student is allowed to choose atmost n books from a collection of 2n+1 books. IF the total number of ways in which he can select atleast one book is 255, then the value of n is

A. 4

B. 5

C. 6

D. 7

Answer: A

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17. The sum of all the coefficients in the binomial expansion of $(1+2x)^n$ is 6561. Let $R=(1+2x)^n=1+F$, where $1 \in N$ and $0<F<1$. IF $x=\frac{1}{\sqrt{2}}$ then $1-\frac{F}{1+\left(\sqrt{2}-1\right)^4}$=

A. $(3\sqrt{2}-4)$

B. $4(3\sqrt{2}+4)$

C. $(\sqrt{2}-1)^4$

D. 1

Answer: C

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18. If $\frac{(1-px)^{-1}}{(1-qx)}=a_0+a_1x+a_2x^2+a_3x^3+\ldots\ldots$ then $a_n=$

A. $\frac{p^{n+1}-q^{n+1}}{q-p}$

B. $\frac{p^{n+1}-q^{n+1}}{p-q}$

C. $\frac{p^n-q^n}{q-p}$

D. $\dfrac{p^n - q^n}{p - q}$

Answer: B

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19. IF

$$\frac{3}{(x-1)(x^2+x+1)} = \frac{1}{x-1} - \frac{x+2}{x^2+x+1} = f_1(x) - f_2(x) \text{ and } - \frac{}{(x}$$

A. 1

B. $\dfrac{-1}{3}$

C. 0

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

Answer: C

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20. Let M and m respectively denote the maximum and the minimum values of

$\left[f(\theta)^2\right], where f(\theta) = \sqrt{a^2 + \cos^2\theta + b^2\sin^2\theta} + \sqrt{a^2\sin^2\theta + b^2\cos^2\theta}.$

Then M-m=

A. $a^2 + b^2$

B. $(a - b)^2$

C. $a^2 b^2$

D. $(a + b)^2$

Answer: B

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21. IF$\cos A = \frac{-60}{61}$ and $\tan B = -\frac{7}{24}$ and neither A nor B in the second quadrant, then the angle $A + \frac{B}{2}$ lies in the quadrant

A. 1

B. 2

C. 3

D. 4

Answer: A

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22.

$\cos^2 5^\circ - \cos^2 15^\circ - \sin^2 15^\circ + \sin^2 35^\circ + \cos 15^\circ \sin 15^\circ - \cos 5^\circ \sin 35^\circ$

A. 0

B. 1

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

D. 2

Answer: A

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23. IF $\cos\theta \neq 0, \quad \text{and} \quad \sec\theta - 1 = (\sqrt{2}-1)\tan\theta$ then $\theta =$

A. $n\pi + \frac{\pi}{8}, n \in Z$

B. $2n\pi + \frac{\pi}{4} \quad \text{or} \quad 2n\pi, n \in Z$

C. $2n\pi + \frac{\pi}{8}, n \in Z$

D. $2n\pi - \frac{\pi}{4} \quad \text{or} \quad 2n\pi, n \in Z$

Answer: B

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24. $\cot\left[\sum_{n=3}^{32} \cot^{-1}\left(1 + \sum_{k=1}^{n} 2K\right)\right]$ =

A. $\frac{10}{3}$

B. $\frac{8}{3}$

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

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

Answer: A

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25. IF $\sin x \cos hy = \cos\theta, \cos x \sin hy = \sin\theta$ and $4\tan x = 3$.Then, $\sinh^2 y =$

A. $\frac{4}{5}$

B. $\frac{9}{16}$

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

D. $\frac{16}{25}$

Answer: D

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26. In triangle ABC, if

$$\frac{b+c}{9}=\frac{c+a}{10}=\frac{a+b}{11}, then \frac{\cos A+\cos B}{\cos C}=$$

A. $\frac{9}{10}$

B. $\frac{10}{11}$

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

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

Answer: C

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27. In a ΔABC, with usual notation, match the items in List-I with the terms in List-II and choose the correct option.

	List I	List II
(A)	$r_1 r_2 \sqrt{\left(\frac{4R - r_1 - r_2}{r_1 + r_2}\right)}$	1. b
(B)	$\frac{r_2(r_3 + r_1)}{\sqrt{r_1 r_2 + r_2 r_3 + r_3 r_1}}$	2. a^2, b^2, c^2 are in AP
(C)	$\frac{a}{c} = \frac{\sin(A - B)}{\sin(B - C)}$	3. Δ
(D)	$bc \cos^2 \frac{A}{2}$	4. $R\, r_1 r_2 r_3$
		5. $s(s - a)$

A. 4 3 1 5

B. 5 4 3 2

C. 3 1 2 5

D. 4 5 2 1

Answer: C

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28. If a,b and c are the sides of ΔABC for which $r_1 = 8, r_2 = 12$ and $r_3 = 24$ then the ordered triad (a,b,c)=

A. (12,20,16)

B. (12,16,20)

C. (16,12,20)

D. (20,16,12)

Answer: B

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29. If 4i + 7j + 8k, 2i + 3j + 4k, 2i + 5j + 7k are position vectors of A, B, C of Δ ABC then position vector of the point where the bisector of angle A meets BC is

A. $2\hat{i} + \frac{13}{3}\hat{j} + 2\hat{k}$

B. $2\hat{i} - \frac{13}{3}\hat{j} + 6\hat{k}$

C. $2\hat{i} + 13\hat{j} + 6\hat{k}$

D. $2\hat{i} + \dfrac{13}{3}\hat{j} + 6\hat{k}$

Answer: D

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30. The equation of the plane passing through the point $\hat{i} + 2\hat{j} - \hat{k}$ are perpendicular to the line of intersection of the planes $r.\left(3\hat{i} - \hat{j} + \hat{k}\right) = 1 \text{ and } r.\left(\hat{i} + 4\hat{j} - 2\hat{k}\right) = 2$, is

A. $r.\left(-2\hat{i} - 5\hat{j} + \hat{k}\right) = 0$

B. $r.\left(\hat{i} + 7\hat{j} + 4\hat{k}\right) = 0$

C. $r.\left(2\hat{i} - 7\hat{j} - 13\hat{k}\right) = 1$

D. $r.\left(-2\hat{i} + 7\hat{j} + 13\hat{k}\right) = 0$

Answer: C

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31. If the position vectors of the vertices A,B and C of ΔABC are $\hat{i}+2\hat{j}-5\hat{k},\ -2\hat{i}+2\hat{j}+\hat{k}$ and $2\hat{i}+\hat{j}-\hat{k}$ respectively, then $\angle B=$

A. $\cos^{-1}\left(\frac{7}{3\sqrt{10}}\right)$

B. $\cos^{-1}\left(\frac{8}{105}\right)$

C. $\cos^{-1}\left(\frac{1}{\sqrt{42}}\right)$

D. $\cos^{-1}\left(-\frac{7}{3\sqrt{10}}\right)$

Answer: B

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32. IF the position vectors of the vertices of a ΔABC are $OA=3\hat{i}+\hat{j}+2\hat{k}, OB=\hat{i}+2\hat{j}+3\hat{k}$ and $OC=2\hat{i}+3\hat{j}+\hat{k}$, then the length of the altitude of ΔABC drawn from A is

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

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

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

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

Answer: B

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33. A new tetrahedron is formed by joining the centroids of the faces of a given tetrahedron OABC. Then the ratio of the volume of the new tetrahedron to that of the given tetrahedron is

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

B. $\frac{1}{27}$

C. $\frac{5}{62}$

D. $\frac{1}{162}$

Answer: B

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34. Let $A = 2\hat{i} + \hat{j} - 2\hat{k}$ and $B = \hat{i} + \hat{j}$. If C is a vector such that $A.C = |C|, |C - A| = 2\sqrt{2}$ and the angle between $A \times B$ and C is 30°, then the value of $|(A \times B) \times C|$ is

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

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

C. 3

D. 2

Answer: B

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35. IF $a_0, a_1 \ldots, a_{11}$ are the arithmetic progression with common difference d, then their mean deviation from their arithmetic mean is

A. $\frac{30}{11}|d|$

B. $2|d|$

C. $3|d|$

D. $12|d|$

Answer: C

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36. The variance of the following continuous frequency distribution is

Class Interval	0-10	10-20	20-30	30-40
Frequency	2	3	4	1

A. 201

B. 62

C. 19

D. 84

Answer: D

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37. IF two sections of strengths 30 and 45 are formed from 75 students who are admitted in a school,then the probability that two particular students are always together in the same section is

A. $\frac{66}{185}$

B. $\frac{19}{37}$

C. $\frac{29}{185}$

D. $\frac{18}{37}$

Answer: B

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38. A bag contains 2n coins out of which n-1 are unfair with heads on both sides and the remaining are fair. One coin is picked from the bag at random and tossed. If the probability that head falls in the toss is $\frac{41}{56}$, then the number of unfair coins in the bag is

A. 18

B. 15

C. 13

D. 14

Answer: C

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39. Bag A contains 6 Green and 8 Red balls and bag B contain 9 Green and 5 Red balls . A card is drawn at random from a well shuffled pack of 52 playing cards. IF is a spade, two balls are drawn at random from bag A, otherwise two balls are drawn at random from bag B. IF the two balls are found to be of the same colour, then the probability that they are drawn from bag A is

A. $\frac{43}{181}$

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

C. $\frac{48}{131}$

D. $\frac{43}{138}$

Answer: A

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40. A random variable X has the probability distribution

$X = x_i$	1	2	3	4	5	6
$P(X = x_i)$	0.2	0.3	0.12	0.1	0.2	0.08

A. 0.31

B. 0.62

C. 0.82

D. 0.41

Answer: C

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41. In a poisson distribution with unit mean, $\sum_{x=0}^{\infty} |x - \bar{x}| P(X = x) = (\bar{x}$

is the mean of the distribution).

A. e

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

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

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

Answer: C

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42. Two straight rods of lengths 2a and 2b move along the coordinate axes in such a way that their extremities are always concyclic. Then the locus of the centres of such circles is

A. $2(x^2+y^2)=a^2+b^2$

B. $2(x^2-y^2)=a^2-b^2$

C. $x^2+y^2=a^2+b^2$

D. $x^2-y^2=a^2-b^2$

Answer: D

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43. When the coordinate axes ar rotated about the origin in the positive direction through an angle $\frac{\pi}{4}$, IF the equation $25x^2+9y^2=225$ is transformed to $ax^2+\beta xy+y\gamma^2=\delta$, then $\left(\alpha+\beta+\gamma-\sqrt{\delta}\right)^2$=

A. 3

B. 9

C. 4

D. 16

Answer: B

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44. The equation of the line through the point of intersection of the lines 3x-4y+1=0 and 5x+y-1=0 and making equal non-zero intercepts on the coordinate axes is

A. $2x + 2y = 3$

B. $23x + 23y = 6$

C. $23x + 23y = 11$

D. $2x + 2y = 7$

Answer: C

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45. The line through P(a,2) where $a \neq 0$, making an angle 45° with the positive direction of the X-axis meet the curve $\frac{x^2}{9} + \frac{y^2}{4} = 1$ at A and D and the coordinate axes at B and C. IF PA, PB, PC and PD are in the geometric progression, then 2a=

A. 13

B. 7

C. 1

D. -13

Answer: A

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46. If the equations of the perpendicular bisectors of the sides AB and AC of a Δ ABC are x - y + 5 = 0 and x + 2y =0 respectively and if A is (1,-2), then the equation of the perpendicular bisector of the side BC is

A. $14x + 23y - 40 = 0$

B. $12x + 17y - 28 = 0$

C. $14x - 29y - 30 = 0$

D. $7x - 12y + 15 = 0$

Answer: A

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47. If each line of a pair of lines passing through origin is at a perpendicular distance of 4 units from the point (3,4) then the equation of the pair of lines is

A. $7x^2 + 24xy = 0$

B. $7y^2 + 24xy = 0$

C. $7y^2 - 24xy = 0$

D. $7x^2 - 24xy = 0$

Answer: B

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48. Variable straight lines y=mx+c make intercepts on the curve $y^2 - 4ax = 0$ which subtend a right angle at the origin. Then the point of concurrence of these lines y=mx+c is

A. $(4a, 0)$

B. $(2a, 0)$

C. $(-4a, 0)$

D. $(-2a, 0)$

Answer: A

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49. The abscissae of two points P,Q are the roots of the equation $2x^2 + 4x - 7 = 0$ and their ordinates are the roots of the equation $3x^2 - 12x - 1 = 0$. Then the centre of the circle with PQ as a diameter is

A. $(-1, 2)$

B. $(-2, 6)$

C. $(1, -2)$

D. $(2, -6)$

Answer: A

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50. The angle between a pair of tangents drawn from a point P to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α. The equation of the locus of the point P is

A. $x^2 + y^2 + 4x - 6y + 4 = 0$

B. $x^2 + y^2 + 4x - 6y - 9 = 0$

C. $x^2 + y^2 - 4x + 6y - 4 = 0$

D. $x^2 + y^2 + 4x - 6y + 9 = 0$

Answer: D

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51. The equation to the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ at this point (-1,1) is

A. $5x^2 + 5y^2 + 9x - 6y - 7 = 0$

B. $5x^2 + 5y^2 - 8x - 14y - 32 = 0$

C. $5x^2 + 5y^2 - 6x + 8y - 8 = 0$

D. $5x^2 + 5y^2 + 6x - 8y - 12 = 0$

Answer: B

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52. Suppose that the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ has its centre on $2x + 3y - 7 = 0$ and cuts the circles $x^2 + y^2 - 4x - 6y + 11 = 0$ and $x^2 + y^2 - 10x - 4y + 21 = 0$ orthogonally. Then $5g - 10f + 3c =$

A. 0

B. 1

C. 3

D. 9

Answer: D

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53. If the radical axis of the circles $x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$ touches the circle $x^2 + y^2 + 2x + 2y + 1 = 0$, then $(4g - 3)(f - 2) =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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54. The parabola $x^2 = 4ay$ makes an intercept of length $\sqrt{40}$ units on the line $y = 1 + 2x$ then a values of 4a is

A. A 2

B. B -2

C. C -1

D. D 4

Answer: B

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55. The locus of the points of intersection of perpendicular normals of the parabola $y^2 = 4ax$ is

A. $y^2 - 2ax + a^2 = 0$

B. $y^2 - ax + 2a^2 = 0$

C. $y^2 - ax + 2a^2 = 0$

D. $y^2 - ax + 3a^2 = 0$

Answer: D

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56. P is a variable point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with foci F_1 and F_2. IF A is the area of the triangle PF_1, F_2, then the maximum value of A is

A. $\frac{e}{ab}$

B. $\frac{ae}{b}$

C. $\frac{ae}{b}$

D. $\frac{ab}{e}$

Answer: C

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57. If the line joining the point A (a) and $B(\beta)$ on the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ is a focal chord, then one possible value of $\cot\frac{\alpha}{2}.\cot\frac{\beta}{2}$ is

A. -3

B. 3

C. -9

D. 9

Answer: C

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58. The equation of a tangent to the hyperbola $16x^2 - 25y^2 - 96x + 100y - 356 = 0$ which makes an angle 45° with its transverse axis is

A. $x - y + 2 = 0$

B. $x - y + 4 = 0$

C. $x + y + 2 = 0$

D. $x + y + 4 = 0$

Answer: A

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59. If P(0,7,10), Q(-1,6,6) and R (-4,9,6) are three points in the space , then PQR is

A. right angled isosceles triangle

B. equilateral triangle

C. isosceles but not right angled triangle

D. scalene triangle

Answer: A

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60. A(2,3,5), B(a,3,3) and $C(7, 5, \beta)$ are the vertices of a triangle. If the median through A is equally inclined with the co-ordinate axes, then $\cos^{-1}\left(\frac{\alpha}{\beta}\right) =$

A. $\cos^{-1}\left(\frac{-1}{9}\right)$

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

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

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

Answer: A

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61. The plane $3x + 4y + 6z + 7 = 0$ is rotated about the line $r = \left(\hat{i} + 2\hat{j} - 3\hat{k}\right) + t\left(2\hat{i} - 3\hat{j} + \hat{k}\right)$ until the plane passes through origin. The equation of the plane is the new position is

A. $x + y + z = 0$

B. $6x + 3y - 4z = 0$

C. $4x - 5y - 2z = 0$

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

Answer: A

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62. IF $\lim_{x \to \infty} \left\{ \frac{x^3 + 1}{x^2 + 1} - (\alpha x + \beta) \right\}$ exist and equal to 2, then the ordered pair (α, β) of real numbers is

A. $(1, \ -1)$

B. (-2,1)

C. (-1,1)

D. (1,-2)

Answer: D

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63. For $k > 0, \sum_{x=0}^{\infty} \frac{k^x}{x!} \lim_{n \to \infty} \frac{n!}{(n-x)!} \left(1 - \frac{k}{n}\right)^{n-x} \left(\frac{1}{n}\right)^x =$

A. 0

B. k

C. x

D. 1

Answer: D

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64. Let $f: R \to R$ be the function defined by

$$f(x)=\begin{cases} 5 & \text{if} & x<1 \\ a+bx & \text{if} & 1<x<3 \\ b+5x & \text{if} & 3\le x<5 \\ 30 & \text{if} & x\ge 5 \end{cases}$$ then f is

A. continuous if a=5 and b=5

B. continuous if a=0 and b=5

C. continuous if a=-5 and b=10

D. not continuous for any values of a and b

Answer: D

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65. Let [x] denote the greatest integer less than or equal to x, Then the number of points where the function $y=[x]+1|1-x|,\ -1\le x\le 3$ is not differentiable, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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66. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a\left(x^3-y^3\right), then y^2\frac{dy}{dx}=$

A. $\sqrt{\frac{1-y^6}{1-x^6}}$

B. $x\sqrt{\frac{1-y^6}{1-x^6}}$

C. $x^2\sqrt{\frac{1-y^6}{1-x^6}}$

D. $\frac{1}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$

Answer: C

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67. If y=f(x) is twice differentiable function such that at a point $P, \frac{dy}{dx} = 4, \frac{d^2y}{dx^2} = -3, then \left(\frac{d^2x}{dy^2}\right) =$

A. $\frac{64}{3}$

B. $\frac{16}{3}$

C. $\frac{3}{16}$

D. $\frac{3}{64}$

Answer: D

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68. The time T of oscillation of a simple pendulum of length L is governed by $T = 2\pi\sqrt{\frac{L}{g}}$, where g is a constant. The percentage by which the length be changed in order to correct an error of loss equal to 2 minutes of time per day is

A. $-\frac{5}{18}$

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

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

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

Answer: A

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69. Let A,G,H and S respectively denote the arithmetic mean, geometric mean, harmonic mean and the sum of the numbers $a_1, a_2, a_3 \ldots \ldots . a_n$. Then the value of x at which the function $f(x) = \sum_{k=1}^{n} (x - a_k)^2$ has minimum is

A. S

B. H

C. G

D. A

Answer: D

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70. For $m > 1, n > 1$ the value of c for which the Rolle's theorem is applicable for the function $f(x) = x^{2m-1}(a-x)^{2n}$ in (0,a) is

A. $\dfrac{2am-1}{m+2n-1}$

B. $\dfrac{a(m-n+1)}{2m+2n}$

C. $\dfrac{a(2m-1)}{2m+2n-1}$

D. $\dfrac{a(2m+1)}{m+n-1}$

Answer: C

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71. If the function $f:[-1,1] \to R$ defined by

A. a maximum

B. a minimum

C. both maximum and minimum

D. neither maximum nor minimum

Answer: D

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72. $\int \frac{(x-1)dx}{(x+1)\sqrt{x^3+x^2+x}} =$

A. $2\tan^{-1}\left(\frac{\sqrt{1+x+x^2}}{x}\right)+c$

B. $\tan^{-1}\left(\frac{\sqrt{1+x+x^2}}{x}\right)+c$

C. $\tan^{-1}\left(\sqrt{\frac{x}{1+x+x^2}}\right)+c$

D. $\tan^{-1}\left(\sqrt{\frac{1+x^2}{x}}\right)+c$

Answer: A

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73. If $I(x) = \int x^2 (\log x)^2 dx$ and $I(I) = 0$ then I(x)

A. $\frac{x^3}{18}\left[8(\log x)^2 - 3\log x\right] + \frac{7}{18}$

B. $\frac{x^3}{27}\left[9(\log x)^2 + 6\log x\right] - \frac{2}{27}$

C. $\frac{x^3}{27}\left[9(\log x)^2 + 6\log x + 2\right] - \frac{2}{27}$

D. $\frac{x^3}{27}\left[9(\log x)^2 + 6\log x - 2\right] + \frac{2}{27}$

Answer: C

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74. $\int \frac{x^5 dx}{(x^2 + x + 1)(x^6 + 1)(x^4 - x^3 + x - 1)} =$

A. $\log_e \left|\frac{x^6 - 1}{x^6 + 1}\right| + c$

B. $\frac{1}{12}\log_e \left|\frac{x^6 - 1}{x^6 + 1}\right| + c$

C. $\frac{1}{12}\log_e \left|\frac{x^4 + 1}{x^4 - 1}\right| + c$

D. $\log_e\left|\frac{x^6+4}{x^6-1}\right|+c$

Answer: B

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75. $\int\frac{dx}{x+\sqrt{x-1}}=$

A. $\log_e\left|x+\sqrt{x-1}\right|-\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

B. $\frac{1}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right|-\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

C. $\frac{2}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right|-\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

D. $\log_e\left|x+\sqrt{x-1}\right|-\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

Answer: D

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76. $\int_{\log 2}^{t}\frac{dx}{\sqrt{e^x-1}}=\frac{\pi}{6}$, then t=

A. $2.\log_e 2$

B. $3.\log_e 2$

C. $4.\log_e 2$

D. $8.\log_e 2$

Answer: A

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77. $\int_0^1 \frac{\log_e(1+x)}{1+x^2}dx =$

A. $\frac{\pi}{4}\log_e 2$

B. $\frac{\pi}{6}\log_e 6$

C. $\frac{\pi}{2}\log_e 8$

D. $\frac{\pi}{8}\log_e 2$

Answer: D

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78. IF the area of the circle $x^2 + y^2 = 2$ is divided into two parts by the parabola $y = x^2$, then the area (in sq units) of the larger part is

A. $\frac{3\pi}{2} - \frac{1}{3}$

B. $6\pi - \frac{4}{3}$

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

D. $4\pi - \frac{1}{4}$

Answer: A

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79. If c is a parameter, then the differential equation of the family of curves $x^2 = c(y + c)^2$ is

A. $x\left(\frac{dy}{dx}\right)^3 + y\left(\frac{dy}{dx}\right)^2 - 1 = 0$

B. $x\left(\frac{dy}{dx}\right)^3 - y\left(\frac{dy}{dx}\right)^2 + 1 = 0$

C. $x\left(\frac{dy}{dx}\right)^3 + y\left(\frac{dy}{dx}\right)^2 + 1 = 0$

D. $x\left(\frac{dy}{dx}\right)^3 - y\left(\frac{dy}{dx}\right)^2 - 1 = 0$

Answer: D

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80. IF f(x), f'(x) f''(x) are positive functions and f(0)=1, f')0)=2 then the solution of the differential equation $\begin{vmatrix} f(x) f'(x) \\ f'(x) f''(x) \end{vmatrix} = 0$ is

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