MATHS

BOOKS - DHANPAT RAI & CO MATHS (HINGLISH)

QUADRATIC EXPRESSIONS AND EQUATIONS

Illustration

1. $If a, b, c, d \in R$ such that $a < b < c < d,$ then roots of the equation

$(x - a)(x - c) + 2(x = b)(x - d) = 0$

A. are imaginary

B. are equal

C. are real and distinct lying between a and b

D. real and distinct lying between a and d.

Answer: D

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2. If $6, 8$ and 12 are l^{th}, m^{th} and n^{th} terms of an $A.P.$ and $f(x) = nx^2 + 2lx - 2m$, then the equation $f(x) = 0$ has -

A. both roots negative

B. both roots greater than 2

C. one root negative other greater than 1

D. exactly one root in (0, 1).

Answer: D

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3. Find the harmonic mean of the roots of the equation $\left(5 + \sqrt{2}\right)x^2 - \left(4 + \sqrt{5}\right)x + \left(8 + 2\sqrt{5}\right) = 0$

A. 2

B. 4

C. 7

D. 8

Answer: B

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4. If α and β are the roots of the equation $x^2 - p(x+1) - q = 0$ then the value of $\frac{\alpha^2 + 2\alpha + 1}{\alpha^2 + 2\alpha + q} + \frac{\beta^2 + 2\beta + 1}{\beta^2 + 2\beta + q}$ is

A. 1

B. 2

C. 3

D. 0

Answer: A

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5. If the roots of the equation $\frac{1}{x+p}+\frac{1}{x+q}=\frac{1}{r}$ are equal in magnitude and opposite in sign, then product of roots is

A. $-\frac{1}{2}(p^2-q^2)$

B. p^2+q^2

C. $\frac{1}{2}(p^2-q^2)$

D. $-\frac{1}{2}(p^2+q^2)$

Answer: D

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6. Let α and β be the roots of equation $px^2+qx+r=0, p\neq 0$.If p, q, r are in A.P. and $\frac{1}{\alpha}+\frac{1}{\beta}=4$, then the value of $|\alpha-\beta|$ is :

A. $\frac{\sqrt{34}}{9}$

B. $\frac{2\sqrt{13}}{9}$

C. $\frac{\sqrt{61}}{9}$

D. $\frac{2\sqrt{17}}{9}$

Answer: B

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7. Let α & β are roots of equation $x^2 - 6x - 2 = 0$ where $\alpha > \beta$. if $a_n = \alpha^n - \beta^n$; $n \geq 1$ then $\frac{a_{10} - 2a_8}{2a_9} =$

A. 3

B. -3

C. 6

D. -6

Answer: A

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8. If $\alpha.\beta$ are the roots of $x^2+bx+c=0$ and $\alpha+h, \beta+h$ are the roots of $x^2+qx+r=0$ then $2h=$

A. b+q

B. b-q

C. $\frac{b+q}{2}$

D. 0

Answer: B

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9. यदि समीकरण $x^2+ax+1=0$ के मूलों का अंतर $\sqrt{5}$ से कम है ,तब $a \in$

A. $(3, \infty)$

B. $(-\infty, -3)$

C. $(-3, 3)$

D. $(-3, \infty)$

Answer: C

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10. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 30^0$ and $\tan 15^0$, respectively, then find the value of $q - p$.

A. 2

B. 3

C. 0

D. 1

Answer: D

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11. If, for a positive integer n, the quadratic equation, $x(x+1) + (x-1)(x+2) + \ + (x+n-1)(x+n) = 10n$ has two

consecutive integral solutions, then n is equal to : 10 (2) 11 (3) 12 (4) 9

A. 2

B. 3

C. 0

D. 11

Answer: D

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12. If $\tan A$ and $\tan B$ are the roots of $x^2 - px + q = 0$, then the value ofsin$^2(A + B)$ is

A. $\frac{p^2}{p^2 + (1+q)^2}$

B. $\frac{p^2}{p^2 + q^2}$

C. $\frac{q^2}{p^2 + (1-q)^2}$

D. $\frac{p^2}{(p+q)^2}$

Answer: A

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13. त्रिभुज $PQR, \angle R = 90^\circ$ मे यदि $\tan\left(\frac{P}{2}\right)$ यदि $\tan\left(\frac{Q}{2}\right)$ समीकरण $ax^2 + bx + c = 0$ के मूल है तो

A triangle $PQR, \angle R = 90^\circ$ and $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ roots of the $ax^2 + bx + c = 0$ then`

A. a+b = c

B. b+c = 0

C. a+c = b

D. b = c

Answer: A

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14. For the equation, $3x^2 + px + 3 = 0, p > 0,$ if one of the roots is square of the other, then $'p'$ is equal to:

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

B. 1

C. 3

D. $2/3$

Answer: C

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15. Let p, q be integers and let α, β be the roots of the equation $x^2 - 2x + 3 = 0$ where $\alpha \neq \beta$ For $n = 0, 1, 2, \ldots\ldots,$ Let $\alpha_n = p\alpha^n + q\beta^n$ value $\alpha_9 =$

A. $a_n + 1 = a_n + a_n - 1$

B. $a_n + 2 = a_n + 1 + a_n - 1$

C. $a_n + 1 = a_n + 1$

D. $a_n + 1 = a_n - 1 + 1$

Answer: A

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16. In illustration 13, if $a_4 = 28, \text{then} p + 2q =$

A. 21

B. 11

C. 7

D. 12

Answer: D

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17. Let S be the set of all non-zero numbers αsuch that the quadratic equation $\alpha x^2 - x + \alpha = 0$has two distinct real roots $x_1,$ and x_2 satisfying the inequality $|x_1 - x_2| < 1$ which of the following intervals is(are) a subset of S?

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

B. $\left(-\frac{1}{\sqrt{5}}, 0\right)$

C. $\left(0, \frac{1}{\sqrt{5}}\right)$

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

Answer: D

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18. Let a be a non-zero real number and α, β be the roots of the equation $ax^2 + 5x + 2 = 0$. Then the absolute value of the difference of the roots of the equation $a^3(x+5)^2 - 25a(x+5) + 50 = 0$, is

A. $\left|\alpha^2-\beta^2\right|$

B. $\left|\alpha\beta\left(\alpha^2-\beta^2\right)\right|$

C. $\left|\frac{\alpha^2-\beta^2}{\alpha\beta}\right|$

D. $\left|\frac{\alpha^2-\beta^2}{\alpha^2\beta^2}\right|$

Answer: A

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19. If a, b, c are three distinct positive real numbers, the number of real and distinct roots of $ax^2+2b|x|-c=0$ is 0 b. 4 c. 2 d. none of these

A. 4

B. 2

C. 0

D. none of these

Answer: B

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20. Let p, q, r $\in$ R and $r > p > 0$. If the quadratic equation $px^2 + qx + r = 0$ has two complex roots α and β, then $|\alpha| + |\beta|$, is

A. less than 2 but not equat to 1

B. equal to 2

C. equal to 1

D. greater than 2

Answer: D

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21. The quadratic equation $p(x) = 0$ with real coefficients has purely imaginary roots. Then the equation $p(p(x)) = 0$ has only purely imaginary roots at real roots two real and purely imaginary roots neither real nor purely imaginary roots

A. only purely imaginary roots

B. all real roots

C. two real and two purely imaginary roots

D. neither real nor purely imaginary roots

Answer: D

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22. If the sum of two roots of the equation $x^3 - px^2 + qx - r = 0$ is zero, then:

A. pq = r

B. qr = p

C. pr = q

D. pqr = 1

Answer: A

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23. If the roots of the equation $x^3 + 3ax^2 + 3bx + c = 0$ are in $H.P.$, then (i) $2b^2 = c(3ab - c)$ (ii) $2b^3 = c(3ab - c)$ (iii) $2b^3 = c^2(3ab - c)$ (iv) $2b^2 = c^2(3ab - c)$

A. $\beta = \frac{1}{\alpha}$

B. $\beta = b$

C. $\beta = \frac{c}{b}$

D. $\beta = \frac{b}{c}$

Answer: C

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24. If the roots of the equation $x^3 - px^2 + qx - r = 0$ are in A.P., then

A. $2p^3 = 9pq - 27r$

B. $2q^3 = 9pq - 27r$

C. $p^3 = 9pq - 27r$

D. $2p^3 = 9pq + 27r$

Answer: A

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25. if $x^2 + x + 1$ is a factor of $ax^3 + bx^2 + cx + d$ then the real root of $ax^3 + bx^2 + cx + d = 0$ is : (a) $-\frac{d}{a}$ (B) $\frac{d}{a}$ (C) $\frac{a}{b}$ (D)none of these

A. $\frac{d}{a}$

B. $-\frac{d}{a}$

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

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

Answer: B

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26. If two roots of the equation $x^3 - px^2 + qx - r = 0$ are equal in magnitude but opposite in sign, then:

A. r = pq

B. $r = 2p^3 + pq$

C. $r = p^2q$

D. none of these

Answer: A

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27. If $x^3 + 3x^2 - 9x + c$ is of the form $(x - \alpha)^2(x - \beta)$ then c is equal to

A. -5

B. 27

C. -27

D. 0

Answer: C

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28. Let α, β, γ be the roots of the equation $8x^3 + 1001x + 2008 = 0$ then the value $(\alpha + \beta)^3 + (\beta + \gamma)^3 + (\gamma + \alpha)^3$ is

A. 251

B. 751

C. 735

D. 753

Answer: D

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29. The real roots of the equation $|x|^3 - 3x^2 + 3|x| - 2 = 0$

A. 1

B. 2

C. 3

D. none of these

Answer: B

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30. The equation $x^3 - 6x^2 + 15x + 3 = 0$ has

A. only one positive root

B. two positive and one negative roots

C. no positive root

D. none of these

Answer: C

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31. The quadratic equation whose roots are A.M. and H.M. between the roots of the equation $ax^2 + bx + c = 0$, is

A. $abx^2 + \left(b^2 + ac\right)x + bc = 0$

B. $2abx^2 + \left(b^2 + 4ac\right)x + 2bc = 0$

C. $2abx^2 + \left(b^2 + ac\right)x + bc = 0$

D. none of these

Answer: B

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32. Let Δ^2 be the discriminant and α, β be the roots of the equation $ax^2 + bx + c = 0$. Then, $2a\alpha + \Delta$ and $2a\beta - \Delta$ can be the roots of the

equation

A. $x^2 + 2bx + b^2 = 0$

B. $x^2 - 2bx + b^2 = 0$

C. $x^2 + 2bx - 3b^2 - 16ac = 0$

D. $x^2 - 2bx - 3b^2 + 16ac = 0$

Answer: A

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33. If A, G & H are respectively the A.M., G.M. & H.M. of three positive numbers a, b, & c, then equation whose roots are a, b, & c is given by

A. $x^3 - 3Ax^2 + \frac{3G^3}{H}x - G^3 = 0$

B. $x^3 + 3Ax^2 + \frac{3G^3}{H}x - G^3 = 0$

C. $x^3 + Ax^2 + \frac{G^3}{H} - G^3 = 0$

D. $x^3 - 3Ax^2 - \frac{3G^3}{H}x - G^3 = 0$

Answer: A

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34. If $\alpha, \beta, \gamma, \sigma$ are the roots of the equation $x^4 + 4x^3 - 6x^3 + 7x - 9 = 0$, then he value of $(1+\alpha^2)(1+\beta^2)(1+\gamma^2)(1+\sigma^2)$ is 9 b. 11 c. 13 d. 5

A. 5

B. 9

C. 11

D. 13

Answer: D

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35. The quadratic equation whose roots are reciprocal of the roots of the equation $ax^2 + bx + c = 0$ is-

A. $cx^2 + bx + a = 0$

B. $bx^2 + cx + a = 0$

C. $cx^2 + ax + b = 0$

D. $bx^2 + ax + c = 0$

Answer: A

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36. If the roots of the equation $x^3 - px^2 + qx - r = 0$ are in A.P., then

A. $27r^2 + 9pqr + 2q^3 = 0$

B. $27r - 9pq + 2p^3 = 0$

C. $2r^2 - 9pqr + 27q^3 = 0$

D. $27r^2 - 9pqr - 2q^3 = 0$

Answer: B

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37. If the roots of the quadratic equation $x^2 - 4x - \log_3 a = 0$ are real, then the least value of a is

A. 81

B. $1/81$

C. $1/64$

D. none of these

Answer: B

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38. If the equation $(3x)^2 + \left(27 \times 3^{1/p} - 15\right)x + 4 = 0$ has equal roots, then p =

A. 0

B. 2

C. $-1/2$

D. none of these

Answer: C

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39. If the roots of the equation $ax^2 + bx + c = 0$ are real and distinct, then

A. both roots are greater than $\frac{-b}{2a}$

B. both roots are less than $\frac{-b}{2a}$

C. one of the roots exceeds $\frac{-b}{2a}$

D. none of these

Answer: C

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40. If the roots of the equation $(x-b)(x-c)+(x-c)(x-a)+(x-a)(x-b)=0$ are equal then

A. a + b + c = 0

B. $a+b\omega+c\omega^2=0$

C. a - b + c = 0

D. none of these

Answer: B

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41. If a,b,c are positive real numbers, then roots of the equation $ax^2+bx+c=0$ has

A. are real and positive

B. real and negative

C. have negative real part

D. have positive real part.

Answer: C

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42. Both the roots of the equation $(x-b)(x-c)+(x-a)(x-c)+(x-a)(x-b)=0$ are always

A. positive

B. negative

C. real

D. none of these

Answer: C

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43. If p, q, r are real and $p \neq q$, then the roots of the equation $(p-q)x^2 + 5(p+q)x - 2(p-q)r$ are

A. real and equal

B. unequal and rational

C. unequal and irrational

D. nothing can be said

Answer: D

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44. The polynomiaal $\left(ax^2 + bx + c\right)\left(ax^2 - dx - c\right), ac \neq 0$ has

A. our real roots

B. at least two real roots

C. at most two real roots

D. No real roots

Answer: B

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45. If the product of the roots of the equation $x^2 - 2\sqrt{2}kx + 2e^{2\log k} - 1 = 0$ is 31, then the roots of the equation are real for k equal to

A. 1

B. 2

C. 3

D. 4

Answer: D

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46. The roots α and β of the quadratic equation $px^2 + qx + r = 0$ are real and of opposite signs. The roots of $\alpha(x-\beta)^2 + \beta(x-\alpha)^2 = 0$ are:

A. positive

B. negative

C. real and of opposite sign

D. Imaginary

Answer: C

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47. The number of integral values of m for which the equation $(1+m^2)x^2 - 2(1+3m)x + (1+8m) = 0$, has no real roots is

A. 1

B. 2

C. 3

D. infinitely many

Answer: D

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48. If a and $b(\neq 0)$ are the roots of the equation $x^2 + ax + b = 0$ then the least value of $x^2 + ax + b$ is

A. $\frac{9}{4}$

B. $-\frac{9}{4}$

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

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

Answer: B

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49. The minimum value of $2x^2 + x - 1$ is

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

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

C. $-\frac{9}{8}$

D. $\frac{9}{4}$

Answer: C

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50. $a, b, c, \in R, a \neq 0$ and the quadratic equation $ax^2 + bx + c = 0$ has no real roots, then which one of the following is not true?

A. $a + b + c > 0$

B. $a(a + b + c) > 0$

C. $ac(a + b + c) > 0$

D. $c(a + b + c) > 0$

Answer: A

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51. 25. The integer k for which the inequality `x^2 -2(4k 1)x 15k 2k-7 0 is valid for any real x is (2) 3 (3) 4 (4) 5

A. 2

B. 3

C. 4

D. none of these

Answer: B

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52. If for all values of x , $x^2 + 2ax + (10 - 3a) < 0$

` find set of values of a

A. $a < -5$

B. $-5 < a < 2$

C. $a > 5$

D. $2 < a < 5$

Answer: B

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53. If α, β are the roots of $ax^2 + bx + c = 0$ and $k \in R$ then the condition so that $\alpha < k < \beta$ is :

A. $ak^2 + bk + c < 0$

B. $a^2k^2 + abk + ac < 0$

C. $a^2k^2 + abk + ac > 0$

D. none of these

Answer: B

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54. The values of a for which the equation $2x^2 - 2(2a+1)x + a(a+1) = 0$ may have one root less them a and other root greater than a are given by

A. $1 > a > 0$

B. $-1 < a < 0$

C. $a \geq 0$

D. $a > 0$ or $a < -1$

Answer: D

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55. All possible values of a, so that 6 lies between the roots of the equation $x^2 + 2(a-3)x + 9 = 0$

A. $a \in [-3/4, \infty)$

B. $a \in (\infty, -3/4)$

C. $a \in (-\infty, 0) \cup (6, \infty)$

D. $a \in (-3/4, 6)$

Answer: B

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56. The set of values of k for which roots of the equation $x^2 - 3x + k = 0$ lie in the interval (0, 2), is

A. $(2, \infty)$

B. $(0, \infty)$

C. $(-\infty, 9/4)$

D. $(2, 9/4)$

Answer: D

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57. The value of a for which the equation $\left(1-a^2\right)x^2+2ax-1=0$ has roots belonging to $(0,1)$ is

A. $a<\frac{1+\sqrt{5}}{2}$

B. $a>2$

C. $\frac{1+\sqrt{5}}{2}<a<2$

D. $a>\sqrt{2}$

Answer: B

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58. The real number k for which the equation, $2x^3+3x+k=0$ has two distinct real roots in [0, 1] (1) lies between 2 and 3 (2) lies between -1 and 0 (3) does not exist (4) lies between 1 and 2

A. lies between 1 and 2

B. lies between 2 and 3

C. lies between n - 1 and 0

D. does not exist

Answer: D

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59. Find all values of a for which both roots of the equation $x^2 - 6ax + 2 - 2a + 9a^2 = 0$ are greater then 3.

A. $a > \frac{9}{11}$

B. $a \geq \frac{11}{9}$

C. $a > \frac{11}{9}$

D. $a < \frac{11}{9}$

Answer: C

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60. If the roots of equation $(a+1)x^2 - 3ax + 4a = 0$ (a is not equals to -1) are greater than unity, then

A. $a \in (-\infty, -1) \cup (2, \infty)$

B. $a \in (-16/7, -0]$

C. $a \in [-16/7, -1)$

D. $a \in (-1/2, \infty)$

Answer: C

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61. The set of values of 'a' for which the roots of the equation $(a-3)x^2 - 2ax + 5a = 0$ are positive, is

A. $(-\infty, 0) \cup (3, \infty)$

B. $[0, 15/4]$

C. $(3, 15/4)$

D. $(3, 15/4]$

Answer: D

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62. The least integral value of $'a'$ for which the equation $x^2 + 2(a-1)x + (2a+1) = 0$ has both the roots positive, is

A. 3

B. 4

C. 1

D. 5

Answer: B

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63. If the roots of the equation $x^2 - 2ax + a^2 - a - 3 = 0$ are ra and less than 3, then $a < 2$ b. $2 <$ $- a \leq 3$ c. `34`

A. $a < 2$

B. $2 \leq a \leq 3$

C. $3 < a \leq 4$

D. $a > 4$

Answer: A

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64. If $x^2 + 2(k+1)x + 9k - 5 = 0$ has only negative roots then k

A. $k \leq 0$

B. $k \geq 0$

C. $k \geq 6$

D. $k \leq 6$

Answer: C

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65. Find the value of k, so that the equation $2x^2 + kx - 5 = 0$ and $x^2 - 3x - 4 = 0$ may have one root in common.

A. $-3, \frac{27}{4}$

B. $3, \frac{-27}{4}$

C. $-3, \frac{-27}{4}$

D. $3, \frac{27}{4}$

Answer: C

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66. If a, b, c are positive real numbers such that the equations $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$, have a common root, then

A. $a + b\omega + c\omega^2 = 0$

B. $a + b\omega^2 + c\omega = 0$

C. $a^3 + b^3 + c^3 = 3abc$

D. all the above

Answer: D

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67. If the equations $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root, then

A. a = b

B. a + b = -1

C. a + b = 1

D. a - b = 1

Answer: D

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68. If every pair from among the equations $x^2 + px + qr = 0, x^2 + qx + rp = 0$ and $x^2 + rx + pq = 0$ has a common root, then the sum of the three common roots is

A. $2(p + q + r)$

B. $p + q + r$

C. $-(p + q + r)$

D. pqr

Answer: B

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69. If every pair from among the equations $x^2 + px + qr = 0, x^2 + qx + rp = 0$ and $x^2 + rx + pq = 0$ has a common root then the product of three common root is

A. pqr

B. 2 pqr

C. $p^2q^2r^2$

D. none of these

Answer: A

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70. If the quadratic equation $ax^2 + 2cx + b = 0$ and $ax^2 + 2bx + c = 0 (b \neq c)$ have a common root, then $a + 4b + 4c =$

A. -2

B. -1

C. 0

D. 1

Answer: C

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71. The values of the parameter a for which the quadratic equations $(1-2a)x^2-6ax-1=0$ and $ax^2-x+1=0$ have at least one root in common, are

A. $0, \frac{1}{2}$

B. $\frac{1}{2}, \frac{2}{9}$

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

D. $0, \frac{1}{2}, \frac{2}{9}$

Answer: C

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72. If the equations $x^2 + bx - 1 = 0$ and $x^2 + x + b = 0$ have a common root different from -1 then $|b|$ is equal to

A. $\sqrt{2}$

B. 2

C. $\sqrt{3}$

D. 3

Answer: C

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73. If $a, b, c \in R$ and equations $ax^2 + bx + c = 0$ and $x^2 + 2x + 3 = 0$ have a common a root, then find $a : b : c$

A. $1 : 2 : 3$

B. $3 : 2 : 1$

C. $1:3:2$

D. $3:1:2$

Answer: A

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74. If x is real then the value of $\frac{x^2-3x+4}{x^2+3x+4}$ lies in the interval

A. $(0, 1/7)$

B. $(7, \infty)$

C. $[1/7, 7]$

D. $[-1/7, 7]$

Answer: C

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75. If x is real then the values of $\frac{x^2+34x-71}{x^2+2x-7}$ does not lie in the interval

A. $[5, 9]$

B. $(-\infty, 5]$

C. $[9, \infty)$

D. $R-(5, 9)$

Answer: D

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76. If x is a real, then the maximum value $\frac{x^2+14x+9}{x^2+2x+3}$

$(i)2(ii)4(iii)6(iv)8$

A. 3, 1

B. 4, -5

C. $0, -\infty$

D. $\infty, -\infty$

Answer: B

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77. Find the values of a for which the expression $\frac{ax^2 + 3x - 4}{3x - 4x^2 + a}$ assumes all real values for all real values of x

A. $a \leq 1$ or $a \geq 7$

B. $a \geq 1$ or $a \leq 7$

C. $1 \leq a \leq 7$

D. none of these

Answer: C

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78. Given that, for all real x, the expression $\frac{x^2+2x+4}{x^2-2x+4}$ lies between $\frac{1}{3}$ and 3. The values between which the expression $\frac{9.3^{2x}+6.3^x+4}{9.3^{2x}-6.3^x+4}$ lies are

A. 3^{-1} and 3

B. -2 and 0

C. -1 and 1

D. 0 and 2

Answer: A

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79. If x $\in$ R then $\frac{x^2+2x+a}{x^2+4x+3a}$ can take all real values if

A. $a \in (0, 2)$

B. $a \in [0, 1]$

C. $a \in [-1, 1]$

D. none of these

Answer: B

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80. Find the values of m for which the expression $2x^2 + mxy + 3y^2 - 5y - 2$ can be resolved into two rational linear factors.

A. ± 7

B. ± 5

C. ± 4

D. ± 1

Answer: A

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81. If the expression $ax^2 + by^2 + cz^2 + 2ayz + 2bzx + 2cxy$ can be resolved into rational factors, then $a^3 + b^3 + c^3$ is equal to

A. abc

B. 3abc

C. 2abc

D. $-3abc$

Answer: B

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82. Let a, b, c be non-zero real numbers, such that $\int_0^1 (1 + \cos^8 x)(ax^2 + bx + c)dx = \int_0^2 (1 + \cos^8 x)(ax^2 + bx + c)dx$, then the quadratic equation $ax^2 + bx + c = 0$ has

A. no root in (0, 2)

B. at least one root in (1, 2)

C. two roots in (0, 2)

D. two imaginary roots

Answer: B

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83. If a + b + c = 0 then the quadratic equation $3ax^2 + 2bx + c = 0$ has

A. at least one root in (0, 1)

B. one root in (2, 3) and the other in (-2, -1)

C. imaginary roots

D. none of these

Answer: A

Watch Video Solution

84. The equation $(x-a)^3+(x-b)^3+(x-c)^3=0$ has :

A. all the roots real

B. one real and two imaginary roots

C. three real roots namely x = a, x = b, x = c

D. none of these

Answer: B

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Section I - Solved Mcqs

1. If α, β are roots of the equation $2x^2+6x+b=0(b<0)$, then $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ is less than

A. 2

B. -2

C. 18

D. none of these

Answer: B

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2. If α, β are roots of the equation $ax^2 + 3x + 2 = 0 (a < 0)$, then $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ is greater than

A. 0

B. 1

C. 2

D. none of these

Answer: D

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3. Find the value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assumes the least value.

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

4. The real values of 'a' for which the quadratic equation $2x^2 - \left(a^3 + 8a - 1\right)x + a^2 - 4a = 0$ possesses roots of opposite sign is given by

A. $a > 5$

B. $0 < a < 4$

C. $a > 0$

D. $a > 7$

Answer: B

Watch Video Solution

5. let α, β be roots of $ax^2 + bx + c = 0$ and γ, δ be the roots of $px^2 + qx + r = 0$and D_1 and D_2 be the respective equations .if $\alpha, \beta, \gamma, \delta$ in $A.P.$ then $\frac{D_1}{D_2}$ is

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

B. $\frac{a^2}{p^2}$

C. $\frac{b^2}{q^2}$

D. $\frac{c^2}{r^2}$

Answer: B

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6. If α, β are the roots of $ax^2 + bx + c = 0; \alpha + h, \beta + h$ are the roots of $px^2 + gx + r = 0$ and D_1, D_2 the respective discriminants of these equations, then $D_1 : D_2 =$

A. $\frac{a^2}{p^2}$

B. $\frac{b^2}{q^2}$

C. $c^2 \frac{)}{r^2}$

D. none of these

Answer: A

Watch Video Solution

7. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + k, \beta + k$ are the roots of $px^2 + qx + r = 0$.then k is equal to

A. $\left(\frac{b}{a} - \frac{q}{p}\right)$

B. $\frac{1}{2}\left(\frac{b}{a}-\frac{q}{p}\right)$

C. $-\frac{1}{2}\left(\frac{a}{b}-\frac{p}{q}\right)$

D. none of these

Answer: B

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8. The ratio of the roots of the equation $ax^2+bx+c=0$ is same equation $Ax^2+Bx+C=0$. If D_1 and D_2 are the discriminants of $ax^2+bx+C=0$ and $Ax^2+Bx+C=0$ respectively, then $D_1:D_2$

A. $\frac{a^2}{p^2}$

B. $\frac{b^2}{q^2}$

C. $\frac{c^2}{r^2}$

D. none of these

Answer: B

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9. If $a \in Z$ and the equation $(x-a)(x-10)+1=0$ has integral roots, then values of a are

A. 10, 8

B. 12, 10

C. 12, 8

D. none of these

Answer: C

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10. clf $a_1, a_2, a_3, . . , a_n \in R$ then $(x-a_1)^2+(x-a_2)^2+....+(x-a_n)^2$ assumes its least value at x=

A. $a_1+a_2+....+a_n$

B. $2(a_1 + a_2, a_3 + ... + a_n)$

C. $n(a_1 + a_2 + ... + a_n)$

D. none of these

Answer: D

Watch Video Solution

11. The number of solutions of the equation $5^x + 5^{-x} = \log_{10} 25, x \in R$ is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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12. If α and β are the roots of the equation $x^2 + ax + b = 0$ and α^4 and β^4 are the roots of the equation $x^2 - px + q = 0$ then the roots of $x^2 - 4bx + 2b^2 - p = 0$ are always

A. both non-real

B. both positive

C. both negative

D. positive and negative

Answer: D

Watch Video Solution

13. The number of solutions of the equation $9x^2 - 18|x| + 5 = 0$ belonging to the domain of definition of $\log_e\{(x+1)(x+2)\}$, is

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

14. If the roots of $ax^2 + bx + c = 0(a > 0)$ be each greater than unity, then

A. a + b + c = 0

B. a + b + c $>$ 0

C. a + b + c $<$ 0

D. none of these

Answer: B

Watch Video Solution

15. If α, β be the roots of the equation $(x-a)(x-b)+c=0(c \neq 0)$, then the roots of the equation $(x-c-\alpha)(x-c-\beta)=c$, are

A. a and b + c

B. a + c and b

C. a + c and b + c

D. a - b and b - c

Answer: C

Watch Video Solution

16. The number of real roots of $(6-x)^4+(8-x)^4=16$, is

A. 0

B. 2

C. 4

D. none of these

Answer: B

Watch Video Solution

17. The number of real solution of the equation $\left(\frac{9}{10}\right)^x = -3 + x - x^2$ is

A. 0

B. 1

C. 2

D. none of these

Answer: A

Watch Video Solution

18. The set of values of a for which each on of the roots of $x^2 - 4ax + 2a^2 - 3a + 5 = 0$ is greater than 2, is

A. $a \in (1, \infty)$

B. $a = 1$

C. $a \in (-\infty, 1)$

D. $a \in (9/2, \infty)$

Answer: D

Watch Video Solution

19. If $(ax^2 + c)y + (ax^2 + c) = 0 and x$ is a rational function of $y and ac$ is negative, then $ac' + c'c = 0$ b. $a/a' = c/c'$ c. $a^2 + c^2 = a'^2 + c'^2$ d. $aa' + \hat{}(') = 1$

A. $ac' + a'c = 0$

B. $\frac{a}{a'} = \frac{c}{c'}$

C. $a^2 + c^2 = a'^2 + c'^2$

D. $aa' + ' = 1$

Answer: B

Watch Video Solution

20. If $p, q, \in \{1, 2, 3, 4\}$, then find the number of equations of the form $px^2 + qx + 1 = 0$ having real roots.

A. 15

B. 9

C. 7

D. 8

Answer: C

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21. If α and $\beta(\alpha < \beta)$ are the roots of the equation $x^2 + bx + c = 0$, where $c < 0 < b$, then

A. $|\alpha| = |\beta|, |\alpha| > 1$

B. $|\alpha| \geq 1$

C. $|\beta| < 1$

D. none of these

Answer: A

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22. the roots of the equation $\left(a + \sqrt{b}\right)^{x^2 - 15} + \left(a - \sqrt{b}\right)^{x^2 - 15} = 2a$ where $a^2 - b = 1$ are

A. $\pm 2, \pm \sqrt{3}$

B. $\pm 4, \pm \sqrt{14}$

C. $\pm 3, \pm \sqrt{5}$

D. $\pm 6, \pm \sqrt{20}$

Answer: B

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23. if $(1+k)\tan^2 x - 4\tan x - 1 + k = 0$ has real roots $\tan x_1$ and $\tan x_2$ then

A. $k^2 \leq 5$

B. $\tan(x_1 + x_2) = 2$

C. for $k = 2$, $x_1 = \pi/4$

D. all of these

Answer: D

Watch Video Solution

24. The number of values of the pair (a, b) for which $a(x+1)^2 + b(-x^2 - 3x - 2) + x + 1 = 0$ is an identity in x, is

A. 0

B. 1

C. 2

D. Infinite

Answer: B

Watch Video Solution

25. If $b > a$, then the equation $(x-a)(x-b) - 1 = 0$, has

A. both roots in [a, b]

B. both roots in $(-\infty, a]$

C. both roots in (b, ∞)

D. one roots in $(-\infty, a)$ and other in (b, ∞)

Answer: D

Watch Video Solution

26. Let $\alpha and \beta$ be the roots of $x^2 - x + p = 0 and \gamma and \delta$ be the root of $x^2 - 4x + q = 0$. If $\alpha, \beta, and \gamma, \delta$ are in G.P., then the integral values of $p and q$, respectively, are $-2, \ -32$ b. $-2, 3$ c. $-6, 3$ d. $-6, \ -32$

A. $-2, \ -32$

B. $-2, 3$

C. $-6, 3$

D. $-6, \ -32$

Answer: A

Watch Video Solution

27. Let $f(x) = ax^3 + 5x^2 - bx + 1$. If $f(x)$ when divide by $2x + 1$ leaves 5 as remainder, and $f'(x)$ is divisible by $3x - 1$, then

A. $a = 26, b = 10$

B. $a = 24, b = 12$

C. $a = 26, b = 12$

D. none of these

Answer: C

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28. If $a, b, c(abc^2)x^2 + 3a^2cx + b^2cx - 6a^2 - ab + 2b^2 = 0$ ares rational.

A. rational

B. imaginary

C. irratiional

D. none of these

Answer: A

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29. If a, b, c are in H.P., then the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$

A. has real and distinct roots

B. has equal roots

C. has no real root

D. none of these

Answer: B

Watch Video Solution

30. The number of values of 'a' for which $\{x^2-(a-2)x+a^2\}\{x^2+ax+(2a-1)\}$ is a perfect square, is

A. 1

B. 2

C. 0

D. none of these

Answer: A

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31. If the ratio of the roots of the equation $ax^2+bx+c=0$ is equal to ratio of roots of the equation $x^2+x+1=0$ then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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32. If a, b, c are positive and a = 2b + 3c, then roots of the equation $ax^2 + bx + c = 0$ are real for

A. $\left|\frac{a}{c} - 11\right| \geq 4\sqrt{7}$

B. $\left|\frac{c}{a} - 11\right| \geq 4\sqrt{7}$

C. $\left|\frac{b}{c} + 4\right| \geq 2\sqrt{7}$

D. $\left|\frac{c}{b} - 4\right| \geq 2\sqrt{7}$

Answer: A

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33. If $a, b, c \in R$ and the quadratic equation $x^2 + (a+b)x + c = 0$ has no real roots then

A. $c(a+b+c) > 0$

B. $c + (a+b+c)c > 0$

C. $c - c(a+b+c) > 0$

D. $c(a+b-c) > 0$

Answer: B

Watch Video Solution

34. If both roots of the equation $x^2 - 2ax + a^2 - 1 = 0$ lie between $(-2, 2)$ then a lies in the interval

A. $-1, 0$

B. 0, 1

C. 1, 2

D. none of these

Answer: A

Watch Video Solution

35. If $.^6C_k + 2 \cdot .^6C_{k+1} + .^6C_{k+2} > .^8C_3$ then the quadratic equation whose roots are α, β and $\alpha^{k-1}, \beta^{k-1}$ have

A. no common root

B. one common root

C. both common roots

D. imaginary roots

Answer: C

Watch Video Solution

36. If α, β be the roots of $4x^2 - 16x + c = 0, c \in R$ such that $1 < \alpha < 2$ and $2 < \beta < 3$, then the number of integral values of c is

A. 5

B. 6

C. 2

D. 3

Answer: D

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37. Let $f(x) = x^3 + 3x^2 + 9x + 6\sin x$ then roots of the equation $\frac{1}{x - f(1)} + \frac{2}{x - f(2)} + \frac{3}{x - f(3)} = 0$, has

A. no real root

B. one real root

C. two real roots

D. more than 2 real roots

Answer: C

Watch Video Solution

38. The number of integral values of a for which $x^2 - (a-1)x + 3 = 0$ has both roots positive and $x^2 + 3x + 6 - a = 0$ has both roots negative is

A. 0

B. 1

C. 2

D. infinite

Answer: B

Watch Video Solution

39. If 1 lies between the roots of equation $y^? - my + 1 = 0$ and [x] denotes the integral part of x, then $\left[\left(\frac{4|x|}{x^2+16}\right)\right]$ where $x \in R$ is equal to

A. 0

B. 1

C. 2

D. undefined

Answer: A

Watch Video Solution

40. If a, b, c, d are four consecutive terms of an increasing A.P., then the roots of the equation $(x-a)(x-c)+2(x-b)(x-d)=0$ are a. non-real complex b. real and equal c. integers d. real and distinct

A. real and distinct

B. non-real complex

C. real and equal

D. integers

Answer: A

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41. If $ax^2 + bx + c = 0, a \neq 0, a, b, c \in R$ has distinct real roots in (1,2) then a and 5a + 2b + c have (A) same sign (B) opposite sign (C) not determined (D) none of these

A. of same type

B. of opposite type

C. undetermined

D. none of these

Answer: A

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42. If the equation $ax^2 + bx + 6 = 0$ has real roots, where $a \in R, b \in R$, then the greatest value of 3a + b, is

A. 4

B. -1

C. -2

D. 1

Answer: C

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43. If a and b are distinct positive real numbers such that $a, a_1, a_2, a_3, a_4, a_5, b$ are in A.P. , $a, b_1, b_2, b_3, b_4, b_5, b$ are in G.P. and $a, c_1, c_2, c_3, c_4, c_5, b$ are in H.P., then the roots of $a_3x^2 + b_3x + c_3 = 0$ are

A. real and distinct

B. real and equal

C. imaginary

D. none of these

Answer: C

Watch Video Solution

44. If coefficients of the equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and roots of the equation are non-real complex and $a + c < b$, then

A. $4a + c > 2b$

B. $4a + c < 2b$

C. $4a + c = 2b$

D. none of these

Answer: B

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45. If α and β are non-real, then condition for $x^2 + \alpha x + \beta = 0$ to have real roots, is

A. $(\alpha - \overline{\alpha})(\beta - \bar{\beta}) = (\alpha\bar{\beta} - \overline{\alpha}\beta)^2$

B. $(\overline{\alpha} - \alpha)(\alpha\bar{\beta} - \overline{\alpha}\beta) = (\beta - \bar{\beta})^2$

C. $(\beta - \bar{\beta})(\alpha\bar{\beta} - \overline{\alpha}\beta) = (\overline{\alpha} - \alpha)^2$

D. none of these

Answer: B

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46. If a $>$ 1, roots of the equation $(1 - a)x^2 + 3ax - 1 = 0$ are

A. one positive and one negative

B. both negative

C. both positive

D. both non-ral complex

Answer: C

Watch Video Solution

47. If a, b $\in$ R, then the equation $x^2 - abx - a^2 = 0$ has

A. one positive and one negative root

B. both positive roots

C. both negative roots

D. non-real roots

Answer: A

Watch Video Solution

48. The set of real values of a for which the equation $x^2 = a(x + a)$ has its roots greater than a is

A. $(-2, -1/2)$

B. $(-1/2, -1/4)$

C. $(-\infty, 0)$

D. none of these

Answer: D

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49. If the equations $ax^2 + bx + c = 0 and x^3 + 3x^2 + 3x + 2 = 0$ have two common roots, then $a = b = c$ b. $a = b \neq c$ c. $a = -b = c$ d. none of these

A. $a = b \neq c$

B. $a = -b = c$

C. $a = b = c$

D. none of these

Answer: C

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50. if $\cos^4 x + \sin^2 x - p = 0$ has real solutions then

A. $p \leq 1$

B. $\frac{3}{4} \leq p < 1$

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

D. none of these

Answer: B

Watch Video Solution

51. If $a.3^{\tan x}+a.3^{-\tan x}-2=0$ has real solutions, $x \neq \frac{\pi}{2}, 0 \leq x \leq \pi,$ then find the set of all possible values of parameter 'a'.

A. [-1, 1]

B. [-1, 0]

C. (0, 1]

D. $(0, \infty)$

Answer: C

Watch Video Solution

52. If a, b are the real roots of $x^2+px+1=0$ and c, d are the real roots of $x^2+qx+1=0$, then $(a-c)(b-c)(a+d)(b+d)$ is divisible by

A. $a-b-c-d$

B. $a+b+c-d$

C. $a+b+c+d$

D. $a-b-c-d$

Answer: C

Watch Video Solution

53. If a and 4a + 3b + 2c have same sign. Then, $ax^2+bx+c=0(a\neq 0)$ cannot have both roots belonging to

A. $(-1,2)$

B. $(-1,1)$

C. (1, 2)

D. $(-2,-1)$

Answer: C

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54. Let $f(x) = ax^2 + bx + c$ and $f(-1) < 1, f(1) > -1, f(3) < -4$ and $a \neq$, then

A. $a > 0$

B. $a < 0$

C. sign of a cannot be determined

D. none of these

Answer: B

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55. The equations $x^2 + b^2 = 1 - 2bx$ and $x^2 + a^2 = 1 - 2ax$ have only oneroot in common then $|a - b| =$

A. 1

B. 0

C. 2

D. none of these

Answer: C

Watch Video Solution

56. Total number of integral values of a such that $x^2 + ax + a + 1 = 0$ has integral roots is equal to : (A) one 45. (B) two (C) three (D) four

A. one

B. two

C. three

D. four

Answer: B

Watch Video Solution

57. If $ax^2 + bx + c = 0$ has no real roots and a, b, c $\in$ R such that $a + c > 0$, then

A. $a - b + c < 0$

B. $a - b + c > 0$

C. $a + c = b$

D. all of these

Answer: B

Watch Video Solution

58. Number of possible value(s) of integer 'a' for which the quadratic equation $x^2 + ax + 16 = 0$ has integral roots, is

A. 4

B. 6

C. 2

D. none of these

Answer: B

Watch Video Solution

59. If a, b, c are rational and no two of them are equal, then the equations

$(b-c)x^2+(c-a)x+(a-b)=0$

and, $a(b-c)x^2+b(c-a)x+c(a-n)=0$

A. have rational roots and exactly one them is common

B. will be such that at least one has rational roots

C. have at least one root common.

D. no common root

Answer: A

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60. If all real values of x obtained from the equation $4^x - (a-3)2^x + a - 4 = 0$ are non-positive, then a lies in

A. (4, 5]

B. (0, 4)

C. $(4, \infty)$

D. none of these

Answer: A

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61. Set of values of 'a' for which both roots of the equation $x^2 - 2x - a^2 = 0$ lie between the roots of the equation $x^2 - 2x + a^2 - 11a + 12 = 0$, is

A. (1, 4)

B. (3/2, 4)

C. $(-4, 4)$

D. none of these

Answer: B

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62. The equation $x^3 - 3x + 1 = 0$ has

A. no rational but three irrational roots

B. one rational and two irrational roots

C. no real roots

D. three rational roots

Answer: A

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63. The set of values of 'a' for which one negative and two positive roots of the equation $x^3 - 3x + a = 0$ are possible, is

A. (0, 2)

B. (0, 4)

C. (2, 4)

D. (0, 10)

Answer: A

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64. If the equation $\frac{1}{x} + \frac{1}{x+a} = \frac{1}{\lambda} + \frac{1}{\lambda+a}$ has real roots that are equal in magnitude and opposite in sign, then

A. $\lambda^2 = 3a^2$

B. $\lambda^2 = 2a^2$

C. $\lambda^2 = a^2$

D. $a^2 = 2\lambda^2$

Answer: D

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65. The equation $|x+1||x-1| = a^2 - 2a - 3$ can have real solutions for x, if a belongs to

A. $(-\infty, -1] \cup [3, \infty)$

B. $\left[1-\sqrt{5}, 1+\sqrt{5}\right]$

C. $\left[1-\sqrt{5}, 1\right] \cup \left[3, 1+\sqrt{5}\right]$

D. none of these

Answer: C

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66. If $x^2 - px + q = 0$ has equal integral roots, then

A. p and q are even integers

B. p and q are odd integers

C. p an even integer and q is a perfect square of a positive integer

D. none of these

Answer: C

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67. Let A, G, and H are the A.M., G.M. and H.M. respectively of two unequal positive integers. Then, the equation $Ax^2 - Gx - H = 0$ has

A. both roots as fractions

B. one root which is a negative fraction and other positive root

C. at least one root which is an integer

D. none of these

Answer: B

Watch Video Solution

68. If b is the harmonic mean of a and c and α, β are the roots of the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$, then

A. $\alpha + \beta = 3$

B. $\alpha + \beta = \frac{1}{2}$

C. $\alpha\beta = 2$

D. $\alpha = 1, \beta = 1$

Answer: D

Watch Video Solution

69. If the expression $a^2(b^2 - c^2)x^2 + b^2(c^2 - a^2)x + c^2(a^2 - b^2)$ is a perfect square, then

A. a, b, c are in A.P.

B. a^2, b^2, c^2 are in A.P.

C. a^2, b^2, c^2 are in H.P.

D. a^2, b^2, c^2 are in G.P.

Answer: C

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70. Let $pandq$ be the roots of the equation $x^2 - 2x + A = 0$ and let $rands$ be the roots of the equation $x^2 - 18x + B = 0$. If `p

A. A = 3, B = 77

B. A = -3, B = 77

C. A = 3, B = - 17

D. none of these

Answer: B

Watch Video Solution

71. The equation $x^2 + ax + b^2 = 0$ has two roots each of which exceeds a member c, then

A. $a^2 < 4b^2$

B. $c^2 + ac + b^2 > 0$

C. $-a/2 < c$

D. none of these

Answer: B

Watch Video Solution

72. If $ax^2 + bx + 10 = 0$ does not have two distinct real roots, then the least value of 5a + b, is

A. -3

B. -2

C. 3

D. none of these

Answer: B

Watch Video Solution

73. For the equation $2x^2 + 6\sqrt{2}x + 1 = 0$

A. roots are rational

B. if one root is $p + \sqrt{q}$, then the other is $-p + \sqrt{q}$

C. and if one root is $p + \sqrt{q}$, then other root $-p + \sqrt{q}$

D. none of these

Answer: C

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74. The value of a for which exactly one root of the equation $e^a x^2 - e^{2a}x + e^a - 1$ lies between 1 and 2 are given by

A. $\text{In}\left(\frac{5-\sqrt{17}}{4}\right) < a < \text{In}\left(\frac{5+\sqrt{17}}{4}\right)$

B. $0 < a < 100$

C. $\text{In}\frac{5}{4} < a < \text{In}\frac{10}{3}$

D. none of these

Answer: A

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75. Let $f(x) = ax^2 + bx + c \forall a, b, c \in R, a \neq 0$ satisfying $f(1) + f(2) = 0$. Then, the quadratic equation $f(x) = 0$ must have :

A. no real root

B. 1 and 2 as real roots

C. two equal roots

D. two distinct real roots

Answer: D

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76. Which one of the following is not true? The quadratic equation $x^2 - 2x - a = 0, a \neq 0,$

A. cannot have a real root if $a < -1$

B. may not have a rational root even if a is a perfect square

C. cannot have an integral root if $n^2 - 1 < a < n^2 + 2n$, where n = 0, 1, 2,.....

D. none of these

Answer: D

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77. In a quadratic equation with leading coefficient 1, a student read the coefficient 16 of x wrong as 19 and obtain the roots as -15 and -4. The correct roots are

A. 6, 10

B. $-6, \ -10$

C. $-7, \ -9$

D. none of these

Answer: B

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78. if α is a real root of $2x^3 - 3x^2 + 6x + 6 = 0,$ then find $[\alpha]$` where [] denotes the greatest integer function.

A. 0

B. -1

C. 1

D. -2

Answer: B

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79. If α and $\beta(\alpha < \beta)$ are the roots of the equation $x^2 + bx + c = 0$, where $c < 0 < b$, then

A. $0 < \alpha < \beta$

B. $\alpha < 0\beta < |\alpha|$

C. $\alpha < \beta < 0$

D. $\alpha < 0 < |\alpha| < \beta$

Answer: B

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80. The number of real solutions of $1 + |e^x - 1| = e^x(e^x - 2)$

A. 0

B. 1

C. 2

D. 4

Answer: B

Watch Video Solution

81. The product of the roots of the equation $(x-2)^2 - 3|x-2| + 2 = 0$, is

A. 2

B. -4

C. 0

D. none of these

Answer: C

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82. IF the equations $x^3 + 5x^2 + px + q = 0$ and $x^3 + 7x^2 + px + r = 0$ have two roots in common, then the product of two non-common roots of two equations, is

A. 35

B. -35

C. 35 + p - q

D. 35 + p + q - r

Answer: A

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83. If the roots of the equation $x^3 + bx^2 + cx - 1 = 0$ form an increasing G.P., then b belongs to the interval

A. $(-3, \infty)$

B. $(-\infty, -3)$

C. $(-1, \infty)$

D. $(-\infty, -1)$

Answer: B

Watch Video Solution

84. If the roots of $x^5 - 40x^4 + Px^3 + Qx^2 + Rx + S = 0$ are in G.P. and sum of their reciprocals is 10, then |S| is equal to

A. 4

B. -4

C. 8

D. none of these

Answer: D

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85. If $f(x) = x^2 + 2bx + 2c^2$, $g(x) = -x^2 - 2cx + b^2$ and $\min f(x) > \max g(x)$ then

A. no real values b and c

B. $0 < c < \sqrt{2}b$

C. $|c| < \sqrt{2}|b|$

D. $|c| > \sqrt{2}|b|$

Answer: D

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86. If one root is square of the other root of the equation $x^2 + px + q = 0$, then the relation between $pandq$ is (2004, 1M)

$p^3 - (3p - 1)q + q^2 = 0$ $p^3 - q(3p + 1) + q^2 = 0$

$p^3 + q(3p - 1) + q^2 = 0$ $p^3 + q(3p + 1) + q^2 = 0$

A. $p^3 - (3p - 1)q + q^2 = 0$

B. $p^3 - (3p + 1)q + q^2 = 0$

C. $p^3 + (3p - 1)q + q^2 = 0$

D. $p^3 + (3p + 1)q + q^2 = 0$

Answer: A

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87. If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0$, then find its roots.

A. $-1, 2$

B. $-1, 1$

C. $0, \ -1$

D. 0, 1

Answer: C

Watch Video Solution

88. If α, β, γ are the roots of the equation $x^3 + 4x + 1 = 0$ then $(\alpha + \beta)^{-1} + (\beta + \gamma)^{-1} + (\gamma + \alpha)^{-1} =$

A. 2

B. 3

C. 4

D. 5

Answer: C

Watch Video Solution

89. If the sum of the two roots of $x^3 + px^2 + ax + r = 0$ is zero then $pq =$

A. $-r$

B. r

C. 2r

D. $-2r$

Answer: B

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90. A polynomial in x of degree greater than three, leaves remainders $2, 1$ and -1 when divided, respectively, by $(x-1), (x+2)$ and $(x+1)$. What will be the remainder when is divided by $(x-1)(x+2)(x+1)$.

A. 2x

B. $-2x$

C. x

D. $-x$

Answer: D

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91. If both the roots of the quadratic equation $x^2 - 2kx + k^2 + k - 5 = 0$ are less than 5 , then k lies in the interval

A. [4, 5]

B. $(-\infty, 4)$

C. $(6, \infty)$

D. (5, 6]

Answer: B

Watch Video Solution

92. All the values of m for whilch both the roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than -2 but less than 4 lie in the interval `-23c. -1

A. $(-2, 0)$

B. $(3, \infty)$

C. $(-1, 3)$

D. (1, 4)

Answer: C

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93. If x is real , the maximum value of $\frac{3x^2 + 9x + 17}{3x^2 + 9x + 7}$ i s

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

B. 41

C. 1

D. $\frac{17}{7}$

Answer: B

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94. If the roots of the equation $bx^2 + cx + a = 0$ be imaginary, then for all real values of x, the expression $3b^2x^2 + 6bcx + 2c^2$ is (1) greater than 4ab (2) less than 4ab (3) greater than $4ab$ (4) less than $4ab$

A. greater than 4 ab

B. less than 4 ab

C. greater than -4ab

D. less than -4ab

Answer: C

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95. The quadratic equations $x^2 6x + a = 0 and x^2 cx + 6 = 0$ have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then the common root is (1) 1 (2) 4 (3) 3 (4) 2

A. 3

B. 2

C. 1

D. 4

Answer: B

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96. Let a, b, c be real. If $ax^2 + bx + c = 0$ has two real roots $\alpha and \beta, where \alpha \langle -1 and \beta \rangle 1$, then show that $1 + \frac{c}{a} + \left|\frac{b}{a}\right| < 0$

A. < 0

B. > 0

C. ≤ 0

D. none of these

Answer: A

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97. if $\alpha, \beta, \gamma$are the roots of $x^3 - 3x^2 + 3x + 7 = 0$ then $\frac{\alpha - 1}{\beta - 1} + \frac{\beta - 1}{\gamma - 1} + \frac{\gamma - 1}{\alpha - 1}$

A. $3/\omega$

B. ω^2

C. $2\omega^2$

D. $3\omega^2$

Answer: D

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98. The smallest value of k, for which both the roots of the equation, $x^2 - 8kx + 16\left(k^2 - k + 1\right) = 0$ are real, distinct and have values at least 4, is

A. 2

B. 3

C. 4

D. none of these

Answer: A

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99. The minimum value of $\frac{x^2 + 2x + 4}{x + 2}$, is

A. 0

B. 1

C. 2

D. 3

Answer: C

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100. α, β be the roots of the equation $x^2 - px + r = 0$ and $\frac{\alpha}{2}, 2\beta$ be the roots of the equation $x^2 - qx + r = 0$ then value of r is

A. $\frac{2}{9}(p-q)(2q-p)$

B. $\frac{2}{9}(q-p)(2p-q)$

C. $\frac{2}{9}(q-2p)(2q-p)$

D. $\frac{2}{9}(2p-q)(2q-p)$

Answer: D

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101. Let a, b, c be the sides of a triangle. No two of them are equal and $\lambda \in R$ If the roots of the equation $x^2 + 2(a+b+c)x + 3\lambda(ab+bc+ca) = 0$ are real, then (a) $\lambda < \frac{4}{3}$ (b) $\lambda > \frac{5}{3}$ (c) $\lambda \in \left(\frac{1}{5}, \frac{5}{3}\right)$ (d) $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$

A. $\lambda < \frac{4}{3}$

B. $\lambda > \frac{5}{3}$

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

D. $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$

Answer: A

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102. In the quadratic $ax^2 + bx + c = 0, D = b^2 - 4ac$ and $\alpha + \beta, \alpha^2 + \beta^2, \alpha^3 + \beta^3,$ are in G.P , where α, β are the roots of $ax^2 + bx + c,$ then (a) $\Delta \neq 0$ (b) $b\Delta = 0$ (c) cDelta = 0(d)Delta = 0`

A. $\Delta \neq 0$

B. $b\Delta = 0$

C. $c\Delta = 0$

D. $bc \neq 0$

Answer: C

Watch Video Solution

103. If α, β, γ are the roots of the equation $x^3 + x + 1 = 0$, then the value of $\alpha^3 + \beta^3 + \gamma^3$, is

A. 0

B. 3

C. -3

D. -1

Answer: C

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104. If α, β are roots of the equation $x^2 + x + 1 = 0$, then the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$, is

A. $x^2 + x + 1 = 0$

B. $x^2 - x + 1 = 0$

C. $x^2 - x - 1 = 0$

D. $x^2 + x - 1 = 0$

Answer: A

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105. If α, β are the roots of the equation $\lambda(x^2 - x) + x + 5 = 0$ and if λ_1 and λ_2 are two values of λ obtained from $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{4}{5}$, then $\frac{\lambda_1}{\lambda_2^2} + \frac{\lambda_2}{\lambda_1^2}$ equals

A. 4192

B. 4144

C. 4096

D. 4048

Answer: D

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106. If a $\in$ R and the equation $(a-2)(x-[x])^2+2(x-[x])+a^2=0$ (where [x] denotes the greatest integer function) has no integral solution and has exactly one solution in (2, 3), then a lies in the interval

A. $(-1, 2)$

B. (0, 1)

C. $(-1, 0)$

D. (2, 3)

Answer: C

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107. If all the roots of $x^3 + px + q = 0p, q \in R, q \neq 0$ are real, then

A. $p < 0$

B. $p = 0$

C. $p > 0$

D. $p > q$

Answer: A

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108. If three distinct real number a,b and c satisfy $a^2(a+p) = b^2(b+p) = c^2(c+p)$, where $p \varepsilon R$, then value of $bc + ca + ab$ is :

A. $-p$

B. p

C. 0

D. $p^2/2$

Answer: C

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109. Let $(\sin a)x^2 + (\sin a)x + 1 - \cos a = 0$. The set of values of a for which roots of this equation are real and distinct, is

A. $\left(0, 2\frac{\tan^{-1}(1)}{4}\right)$

B. $\left(o, \frac{2\pi}{3}\right)$

C. $(0, \pi)$

D. $(0, 2\pi)$

Answer: A

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110. If $x^2 - 10ax - 11b = 0$ have roots $cand.. x^2 - 10cx - 11d = 0$ have roots $aandb$, then find $a + b + c + d$ (2006, 6M)

A. 1220

B. 1110

C. 1210

D. 1310

Answer: C

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111. Q. Let p and q real number such that $p \neq 0, p^2 \neq q$ and $p^2 \neq -q$. if α and β are non-zero complex number satisfying $\alpha + \beta = -p$ and $\alpha^3 + \beta^3 = q$, then a quadratic equation having $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ as its roots is

A. $(p^3+q)x^2-(p^3+2q)x+(p^3+q)=0$

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

C. $(p^3-q)x^2-(5p^3-2q)x+(p^3-q)=0$

D. $(p^3-q)x^2-(5p^3+2q)x+(p^3-q)=0$

Answer: B

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112. Let a, b and c be three real numbers satisfying $[a \quad b \quad c][\{:(1,9,7),(8,2,7),(7,9,7):\}]=[0 \quad 0 \quad 0]$ and α and β be the roots of the equation $ax^2+bx+c=0$, then $\sum_{n=0}^{\infty}\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)^n$, is

A. 6

B. 7

C. $\frac{6}{7}$

D. ∞

Answer: B

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113. The number of distinct real roots of $x^4 - 4x^3 + 12x^2 + x - 1 = 0$ is :

A. 1

B. 0

C. 2

D. 4

Answer: C

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114. The value of b for which the equation $x^2 + bx - 1 = 0$ and $x^2 + x + b = 0$ have one root in common is (a)

$-\sqrt{2}$ (b) $-i\sqrt{3}$ (c) $i\sqrt{5}$ (d) $\sqrt{2}$

A. $\sqrt{2}$

B. $-i\sqrt{3}$

C. $i\sqrt{5}$

D. $\sqrt{2}$

Answer: B

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115. Let for $a \neq a_1 \neq 0$, $f(x) = ax^2 + bx + c$,$g(x) = a_1x^2 + b_1x + c_1$ and $p(x) = f(x) - g(x)$. If $p(x) = 0$ only for $x = -1$ and $p(-2) = 2$ then the value of $p(2)$.

A. 9

B. 6

C. 18

D. 3

Answer: C

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116. 8. Sachin and Rahul attempted to solve a quadratic equation. Sachin made a mistake in writing down the constant term and ended up in roots (4,3). Rahul made a mistake in writing down coefficient of x to get roots (3, 2). The correct roots of equation are:

A. 4, 3

B. $-6, \ -1$

C. $-4, \ -3$

D. 6, 1

Answer: D

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117. let $\alpha(a)$ and $\beta(a)$ be the roots of the equation $\left((1+a)^{\frac{1}{3}}-1\right)x^2+\left((1+a)^{\frac{1}{2}}-1\right)x+\left((1+a)^{\frac{1}{6}}-1\right)=0$ where $a>-1$ then, $\lim_{a\to 0^+}\alpha(a)$ and $\lim_{a\to 0^+}\beta(a)$

A. $-\frac{5}{2}$ and 1

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

C. $-\frac{7}{2}$ and 2

D. $-\frac{9}{2}$ and 3

Answer: B

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118. The number of polynomials f(x) with non-negative integer coefficients of degree ≤ 2, satisfying f(0) = 0 and $\int_0^1 f(x)dx=1$, is

A. 8

B. 2

C. 4

D. 0

Answer: B

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119. If $a \in R$ and the equation $-3(x-[x])^2+2(x-[x])+a^2=0$ (where [x] denotes the greatest integer $\leq x$) has no integral solution, then all possible values of a lie in the interval: (1) (-2,-1) (2) $(\infty, -2) \cup (2, \infty)$ (3) $(-1, 0) \cup (0, 1)$ (4) (1,2)

A. $(-2, -1)$

B. $(-\infty, -2) \cup (2, \infty)$

C. $(-1, 0) \cup (0, 1)$

D. (1, 2)

Answer: C

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120. If $\alpha, \beta \neq 0$, and $f(n) = \alpha^n + \beta^n$ and $|31 + f(1)1 + f(2)1 + f(1)1 + f(2)1 + f(3)1 + f(2)1 + f(3)1 + f(4)| =$, then K is equal to (1) $\alpha\beta$ (2) $\frac{1}{\alpha\beta}$ (3) 1 (4) -1

A. 1

B. -1

C. $\alpha\beta$

D. $\frac{1}{\alpha\beta}$

Answer: A

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121. $e^{|\sin x|} + e^{-|\sin x|} + 4a = 0$ will have exactly four different solutions in $[0, 2\pi]$ if. $a \in R$ (b) $a \in \left[-\frac{3}{4}, -\frac{1}{4}\right]$ $a \in \left[\frac{-1-e^2}{4e}, \infty\right]$ (d) none of these

A. $a \in \left[-\frac{e}{4}, -\frac{1}{4}\right]$

B. $a \in R$

C. $a \in \left[-\frac{-1-e^2}{4e}, \infty\right)$

D. none of these

Answer: D

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122. The sum of all real values of x satisfying the equation $\left(x^2-5x+5\right)^{x\hat{}}(2+4x-60)=1$ is: (1) 3 (2) -4 (3) 6 (4) 5

A. 3

B. -4

C. 6

D. 5

Answer: B::D

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123. Let $-\frac{1}{6} < \theta < -\frac{\pi}{12}$ Suppose α_1 and β_1, are the roots of the equation $x^2 - 2x\sec\theta + 1 = 0$ and α_2 and β_2 are the roots of the equation $x^2 + 2x\tan\theta - 1 = 0$. If $\alpha_1 > \beta_1$ and $\alpha_2 > \beta_2$, then $\alpha_1 + \beta_2$ equals

A. $2(\sec\theta - \tan\theta)$

B. $2\sec\theta$

C. $-2\tan\theta$

D. 0

Answer: C

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Section II - Assertion Reason Type

1. Let a, b, c, p, q be the real numbers. Suppose α, β are the roots of the equation $x^2 + 2px + q = 0$. and $\alpha, \frac{1}{\beta}$ are the roots of the equation $ax^2 + 2bx + c = 0$, where $\beta \notin \{-1, 0, 1\}$. Statement I $\left(p^2 - q\right)\left(b^2 - ac\right) \geq 0$ Statement 11 $b \notin pa$ or $c \notin qa$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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2. Let a, b, c be real. If $ax^2 + bx + c = 0$ has two real roots $\alpha and \beta, where \alpha \langle -1 and \beta \rangle 1$, then show that $1 + \frac{c}{a} + \left|\frac{b}{a}\right| < 0$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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3. If α and β are the roots of the equation $x^2 - ax + b = 0$ and $A_n = \alpha^n + \beta^n$,

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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4. Statement-1: $If\alpha \text{ and } \beta$ are real roots of the quadratic equations $ax^2 + bx + c = 0 \text{ and } -ax^2 + bx + c = 0$, then $\frac{a}{2}x^2 + bx + c = 0$ has a real root between $\alpha \text{ and } \beta$

Statement-2: If f(x) is a real polynomial and $x_1, x_2 \in R$ such that $f(x_1)f_{x_2} < 0$, then f(x) = 0 has at leat one real root between $x_1 \text{ and } x_2$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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5. Statement-1: If a, b, c, A, B, C are real numbers such that $a < b < c$, then

$f(x) = (x-a)(x-b)(x-c) - A^2(x-a) - B^2(x-b) - C^2(x-c)$

has exactly one real root.

Statement-2: If f(x) is a real polynomical and $x_1, x_2 \in R$ such that $f(x_1)f(x_2) < 0$, then f(x) has at least one real root between x_1 and x_2

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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6. Statement I: $x^2 - 5x + 6 < 0$ if $2 < x < 3$ Statement II: If α and $\beta, (\alpha < \beta)$ are the roots of the equation $ax^2 + bx + c = 0$ and $\alpha < x < \beta$ then $ax^2 + bx + c$ and a have opposite signs

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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7. If $a, b, c \in R$ and $a + b + c = 0,$ then the quadratic equation $3ax^2 + 2bx + c = 0$ has (a) at least one root in $[0, 1]$ (b) at least one root in $[1, 2]$ (c) at least one root in $\left[\frac{3}{2}, 2\right]$ (d) none of these

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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8. Statement-1: There is a value of k for which the equation $x^3 - 3x + k = 0$ has a root between 0 and 1.

Statement-2: Between any two real roots of a polynomial there is a root of its derivation.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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9. Statement-1: $If x^2 + ax + 4 > 0 \text{for all} x \in R$, then $a \in (-4, 4)$.

Statement-2: The sign of quadratic expression $ax^2 + bx + c$ is always same as that of 'a' except for those values of x which lie between its roots.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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10. If the roots of the equation $ax^2 + bx + c = 0, a \neq 0 (a, b, c$ are real numbers), are imaginary and $a + c < b,$ then

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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11. Statement (1) : If a and b are integers and roots of $x^2 + ax + b = 0$ are rational then they must be integers. Statement (2): If the coefficient of x^2 in a quadratic equation is unity then its roots must be integers

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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12. Statement-1: If a, b, c are distinct real numbers, then $a\frac{(x-b)(x-c)}{(a-b)(a-c)}+b\frac{(x-c)(x-a)}{(b-c)(b-a)}+c\frac{(x-a)(x-b)}{(c-a)(c-b)}=x$ for each real x.

Statement-2: $If a, b, c \in R$ such that $ax^2+bx+c=0$ for three distinct real values of x, then $a=b=c=0$ i.e. $ax^2+bx+c=0$ for all $x \in R$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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13. Let $f(x) = ax^2 + bx + a, b, c \in R$. If $f(x)$ takes real values for real values of x and non-real values for non-real values of x , then $a = 0$ b. $b = 0$ c. $c = 0$ d. nothing can be said about $a, b,$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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14. Statement-1: $If a, b, c \in R \text{ and } 2a + 3b + 6c = 0$, then the equation $ax^2 + bx + c = 0$ has at least one real root in (0, 1).

Statement-2: If f(x) is a polynomial which assumes both positive and negative values, then it has at least one real root.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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15. Statement-1: $If a \neq 0$ and the equation $ax^2 + bx + c = 0$ has two roots α and β such that $\alpha < -1$ and $\beta > 1$, then a+|b|+c and a have the opposite sign.

Statement-2: $If ax^2 + bx + c$, is same as that of 'a' for all real values of x except for those values of x lying between the roots.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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16. Statement-1: $If a, b, c \in Q$ and $2^{1/3}$ is a root of $ax^2 + bx + c = 0$, then a = b = c = 0.

Statement-2: A polynomial equation with rational coefficients cannot have irrational roots.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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17. Statement-1: $Iff(x) = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}$, then the equation f(x) = 0 has two pairs of repeated roots.

Statement-2 Polynomial equation P(x) = 0 has repeated root α, if $P(\alpha) = 0 \text{ and } P'(\alpha) = f0$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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18. Given that, for all real x, the expression $\frac{x^2+2x+4}{x^2-2x+4}$ lies between $\frac{1}{3}$ and 3. The values between which the expression $\frac{9.3^{2x}+6.3^x+4}{9.3^{2x}-6.3^x+4}$ lies are

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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19. Let a, b, c be real numbers such that $ax^2 + bx + c = 0$ and $x^2 + x + 1 = 0$ have a common root.

Statement-1: a = b = c

Staement-2: Two quadratic equations with real coefficients cannot have only one imainary root common.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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20. Statement-1: The cubic equation $4x^3 - 15x^2 + 14x - 5 = 0$ has a root in the internal (2, 3).

Statement-2: If f(x) is a polynomial equation which has two real roots $\alpha, \beta(\alpha < \beta)$, then f(x) = 0 will have a root $\gamma sucht\hat{}$alpha lt gamma lt beta`.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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21. Statement-1: The equation $\frac{\pi^e}{x-e}+\frac{e^\pi}{x-\pi}+\frac{\pi^\pi+e^e}{x-\pi-e}=0$ has real roots.

Statement-2: If f(x) is a polynomial and a, b are two real numbers such that $f(a)f(b)<0$, then f(x) = 0 has an odd number of real roots between a and b.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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22. Consider a quadratic equation $ax^2 + bx + c = 0$, where 2a + 3b + 6c = 0 and let $g(x) = a\frac{x^3}{3} + b\frac{x^2}{2} + cx$.

Statement-1 The quadratic equation has at least one root in the internal (0, 1).

Statement-2 The Rolle's Theorem is applicable to function g(x) on the interval [0, 1].

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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Exercise

1. If $A = \{x : f(x) = 0\}$ and $B = \{x : g(x) = 0\}$, then $A \cup B$ will be the set of roots of the equation

A. $\{f(x)\}^2 + \{g(x)\}^2 = 0$

B. $\frac{f(x)}{g(x)}$

C. $\frac{g(x)}{f(x)}$

D. none of these

Answer: A

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2. x_1, x_2 are the $x^2 - 3x + A = 0; x_3, x_4$ are roots of the equation $x^2 - 12x + B = 0$ of the equation x_1, x_2, x_3, x_4 form in increasing $GP.$, then

A. p = 2, q = 16

B. p = 2, q = 32

C. p = 4, q = 16

D. p = 4, q = 32

Answer: B

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3. The roots of the equation $\left|x^2 - x - 6\right| = x + 2$ are

A. -2, 1, 4

B. 0, 2, 4

C. 0, 1, 4

D. -2, 2, 4

Answer: D

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4. If the equation $x^3 - 3x + a = 0$ has distinct roots between 0 and 1, then the value of a is

A. 2

B. $1/2$

C. 3

D. none of these

Answer: D

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5. If $f(x) = ax^2 + bx + c, g(x) = -ax^2 + bx + c, whereac \neq 0,$ then prove that $f(x)g(x) = 0$ has at least two real roots.

A. at least three real roots

B. no real roots

C. at least two real roots

D. two real roots and two imaginary roots

Answer: C

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6. The equation $2\cos^2\left(\frac{x}{2}\right)\sin^2 x = x^2 + \frac{1}{x^2}, 0 \leq x \leq \frac{\pi}{2}$ has

A. no real solution

B. one real solution

C. more than one real solution

D. none of these

Answer: A

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7. Write the number of real roots of the equation $(x-1)^2+(x+2)^2+(x-3)^2=0$.

A. 1

B. 2

C. 3

D. none of these

Answer: D

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8. The roots of the equation $\log_2\left(x^2-4x+5\right)=(x-2)$ are

A. 4, 5

B. 2, -3

C. 2, 3

D. 3, 5

Answer: C

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9. Let $a, b, andc$ be real numbers such that $4a + 2b + c = 0andab > 0.$ Then the equation $ax^2 + bx + c = 0.$ $complex\sqrt{}$ b. $exactlyone\sqrt{}$ c. $real\sqrt{}$ d. $noneofthese$

A. real roots

B. complex roots

C. exactly one root

D. none of these

Answer: A

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10. The value of k for which the equation $3x^2 + 2x\left(k^2 + 1\right) + k^2 - 3k + 2 = 0$ has roots of opposite signs, lies in the interval

A. $(- \infty, 0)$

B. $(- \infty, \ - 1)$

C. $(1, 2)$

D. $(3/2, 2)$

Answer: C

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11. If p and q are roots of the quadratic equation $x^2 + mx + m^2 + a = 0$, then the value of $p^2 + q^2 + pq$, is

A. 0

B. a

C. $-a$

D. $\pm m^2$

Answer: C

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12. If one root of the equation $ax^2 + bx + c = 0$ is double the other, then the relation between a, b, c is

A. $b^2 = 9ac$

B. $2b^2 = 9ac$

C. $2b^2 = ac$

D. $b^2 = ac$

Answer: B

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13. If $e^{\cos x} - e^{-\cos x} = 4$, then the value of cos x, is

A. $\log_e\left(2+\sqrt{5}\right)$

B. $-\log_e\left(2+\sqrt{5}\right)$

C. $\log_e\left(-2+\sqrt{5}\right)$

D. none of these

Answer: D

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14. If one root of the polynomial $f(x) = 5x^2 + 13x + k$ is reciprocal of the other, then the value of k is (a) 0 (b) 5 (c) $\frac{1}{6}$ (d) 6

A. 0

B. 5

C. $1/6$

D. 6

Answer: B

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15. If the equations $k\left(6x^2+3\right)+rx+2x^2-1=0$ and $6k\left(2x^2+1\right)+px+4x^2-2=0$ have both roots common then the value of (2r-p) is A. 0 B. 1/2 C.1 D.None

A. 0

B. $1/2$

C. 1

D. none of these

Answer: A

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16. If $x=2+2^{\frac{2}{3}}+2^{\frac{1}{3}}$, then the value of x^3-6x^2+6x is:

A. 3

B. 2

C. 1

D. none of these

Answer: B

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17. Find the number of quadratic equations, which are unchanged by squaring their roots.

A. 2

B. 4

C. 6

D. none of these

Answer: B

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18. If the equation $x^2 - 3kx + 2e^{2\log k} - 1 = 0$ has real roots such that the product of roots is 7 then the value of k is

A. ± 1

B. 2

C. ± 3

D. none of these

Answer: B

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19. If one root of $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of q is

A. $49/4$

B. $4/49$

C. 4

D. none of these

Answer: A

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20. If the roots of the equation $x^2 - px + q = 0$ differ by unity then

A. $p^2 = 4q$

B. $p^2 = 4q + 1$

C. $p^2 = 4q - 1$

D. none of these

Answer: B

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21. If α, β are roots of the equation $ax^2 + bx + c = 0$ then the equation whose roots are $2\alpha + 3\beta$ and $3\alpha + 2\beta$ is

A. $abx^2 - (a+b)cx + (a+b)^2 = 0$

B. $acx^2 - (a+c)bx + (a+c)^2 = 0$

C. $acx^2 + (a+c)bx - (a+c)bx - (a+c)^2 = 0$

D. none of these

Answer: D

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22. The number of roots of the equation, $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ is 0 (b) 1 (c) 2 (d) 3

A. 1

B. 2

C. 0

D. infinitely many

Answer: C

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23. The number of real roots of the equation $|x|^2 - 3|x| + 2 = 0$, is

A. 4

B. 3

C. 2

D. 1

Answer: A

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24. If the equation $\frac{a}{x-a}+\frac{b}{x-b}=1$has two roots equal in magnitude and opposite in sign then the value of $a+b$ is

A. -1

B. 0

C. 1

D. none of these

Answer: B

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25. If one of the roots of the equation $ax^2+bx+c=0$ be reciprocal of one of the $a_1x^2+b_1x+c_1=0$, then prove that $(aa_1-cc_1)^2=(bc_1-ab_1)(b_1c-a_1b)$.

A. $(aa_1-\mathrm{cc}_1)^2=(bc_1-b_1a)(b_1c-a_1b)$

B. $(ab_1-a_1b)^2=(bc_1-b_1c)(ca_1-c_1a)$

C. $(bc_1 - b_1c)^2 = (ca_1 - a_1c)(ab_1 - a_1b)$

D. none of these

Answer: A

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26. If $\sin\alpha$ and $\cos\alpha$ are roots of the equation $px^2 + qx + r = 0$ then :

A. $p^2 - q^2 + 2pr = 0$

B. $(p + r)^2 = q^2 - r^2$

C. $p^2 + q^2 - 2pr = 0$

D. $(p - r)^2 = q^2 + r^2$

Answer: A

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27. If $x - c$ is a factor of order m of the polynomial $f(x)$ of degree `n(1

A. $f'(x)$

B. $f''(x)$

C. $f'''(x)$

D. none of these

Answer: A

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28. If $x - c$ is a factor of order m of the polynomial $f(x)$ of degree `n(1

A. $f^m(x)$

B. $f^{m-1}(x)$

C. $f''(x)$

D. none of these

Answer: B

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29. If a and b are two distinct real roots of the polynomial $f(x)$ such that $a < b$, then there exists a real number c lying between a and b, such that

A. $f(c) - 0$

B. $f'(c) = 0$

C. $f''(c) = 0$

D. none of these

Answer: B

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30. If $ax^3 + bx - c$ is divisible by $x^2 + bx + c$, then 'a' is a root of the equation

A. $cx^2 - bx - 1 = 0$

B. $ax^2 - bx - 1 = 0$

C. $bx^2 - ax - 1 = 0$

D. none of these

Answer: A

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31. If α, β are the roots of $x^2 + px + q = 0 adn x^{2n} + p^n x^n + q^n = 0 and il f(\alpha/\beta), (\beta/\alpha)$ are the roots of $x^n + 1 + (x+1)^n = 0, the \cap (\in N)$ a. must be an odd integer b. may be any integer c. must be an even integer d. cannot say anything

A. an odd integer

B. an even integer

C. any integer

D. none of these

Answer: B

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32. Root(s) of the equatio $9x^2 - 18|x| + 5 = 0$ belonging to the domain of definition of the function $f(x) = \log\left(x^2 - x - 2\right)$, is (are)

A. $\frac{-5}{3}, \frac{-1}{3}$

B. $\frac{5}{3}, \frac{1}{3}$

C. $\frac{-5}{3}$

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

Answer: C

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33. If $x = 1 + i$ is a root of the equation x^3-ix+1-i=0` then the other real root is

A. 1

B. -1

C. 0

D. none of these

Answer: B

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34. Let a, b, c be real numbers, $a \neq 0$. If α is a zero of $a^2x^2 + bx + c = 0, \beta$ is the zero of $a^2x^2 - bx - c = 0$ and $0, \alpha < \beta$ then prove that the equation $a^2x^2 + 2bx + 2c = 0$ has a root γ that always satisfies $\alpha < \gamma < \beta$.

A. $y = \dfrac{\alpha + \beta}{2}$

B. $y = \alpha + \dfrac{\beta}{2}$

C. $y = \alpha/2 + \beta$

D. $\alpha < y < \beta$

Answer: D

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35. If α and β are the roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always

A. two real roots

B. two negative roots

C. two positive roots

D. one positive and one negative roots

Answer: A

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36. The equation $(\cos p - 1)x^2 + \cos px + \sin p = 0$ where x is a variable, has real roots. then the interval of p may be any one of the following :

A. $(0, 2\pi)$

B. $(-\pi, 0)$

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

D. $(0, \pi)$

Answer: D

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37. The number of solution of the equation $2\sin(e^x) = 5^x + 5^{-x}$, is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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38. Let f(x) be a quadratic expression which is positive for all ral x and g(x) = f(x) + f'(x) + f''(x), then for any real x,

A. $g(x) < 0$

B. $g(x) > 0$

C. $g(x) = 0$

D. $g(x) \geq 0$

Answer: B

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39. If c and d are roots of the equation (x-a) (x-b) - k = 0, then a, b are roots of the equation

A. $(x-c)(x-d)-k=0$

B. $(x-c)(x-d)+k=0$

C. $(x-a)(x-c)+k=0$

D. $(x-b)(x-d)+k=0$

Answer: B

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40. If A.M of the roots of $x^2-2ax+b^2=0$ is equal to the .....of the roots of the equation $x^2-2bx+a^2=0$

A. $A>G$

B. $A\neq G$

C. $A=G$

D. none of these

Answer: C

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41. If α and β are the roots of quadratic equation$x^2 + px + q = 0$ and γ and δ are the roots of $x^2 + px - r = 0$ then $(\alpha - \gamma)(\alpha - \delta)$

A. p + q

B. q - r

C. r - q

D. q + r

Answer: D

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42. If the roots of the equation $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$ are equal in magnitude but opposite in sign, then their product, is

A. $\frac{1}{2}(a^2 + b^2)$

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

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

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

Answer: B

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43. If the ratio of the roots of $x^2+px+q=0$ be equal to the ratio of the roots of $x^2+lx+m=0$, then

A. $p^2m=q^2l$

B. $\pm^2=q^2l$

C. $p^2l=q^2m$

D. $p^2m=l^2q$

Answer: D

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44. Find the value of p for which $x+1$ is a factor of $x^4+(p-3)x^3-(3p-5)x^2+(2p-9)x+6$. Find the remaining factor for this value of p.

A. -4

B. 0

C. 4

D. 2

Answer: C

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45. If $\left(x^2-3x+2\right)$ is a factor of $x^4-px^2+q=0$, then the values of p and q are

A. 5, -4

B. $5, 4$

C. $-5, 4$

D. $-5, \ -4$

Answer: B

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46. If the equation $x^2 + px + q = 0$ and $x^2 + p'x + q' = 0$ have a common root show that it must be equal to $\frac{pq' - p'q}{q - q'}$ or $\frac{q - q'}{p' - p}$

A. $\frac{p - p'}{q - q'}$

B. $\frac{p + p'}{q + q'}$

C. $\frac{q' - q}{p - p'}$

D. $\frac{q + q'}{p + p'}$

Answer: C

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47. If the expression $x^2 - 11x + a$ and $x^2 - 14x + 2a$ have a common factor, then the values of 'a' are

A. 0, 24

B. 0, -24

C. 1, -1

D. $-2, 1$

Answer: A

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48. If a, b, c are in GP, then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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49. Fill in the blanks If the quadratic equations $x^2 + ax + b = 0 and x^2 + bx + a = 0 (a \neq b)$ have a common root, then the numerical value of $a + b$ is _____.

A. 1

B. 0

C. -1

D. none of these

Answer: C

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50. Find the values of a for which the roots of the equation $x^2 + a^2 = 8x + 6a$ are real.

A. $[2, 8]$

B. $[-2, 8]$

C. $[-8, 2]$

D. none of these

Answer: B

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51. If the sum of the roots of the equation $(a+1)x^2 = (2a+3)x + (3a+4) = 0$ is -1, then find the product of the roots.

A. 0

B. 1

C. 2

D. 3

Answer: C

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52. If one root of the equation $8x^2 - 6x - k - 3 = 0,$ is the square of the other, then the values of k is

A. 4, -24

B. 4, 24

C. $-4, \ -24$

D. $-4, 24$

Answer: D

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53. Iff $b_1, b_2 = 2(c_1 + c_2,)$ then at least one of the equation $x^2 + b_1 x + c_1 = 0 and x^2 + b_{2x} + c_2 = 0$ has a. imaginary roots b. real roots c. purely imaginary roots d. none of these

A. real roots

B. purely imaginary roots

C. imaginary roots

D. none of these

Answer: A

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54. the real roots of the equation $\left|x^2 + 4x + 3\right| + 2x + 5 = 0$are

A. $-4, \ -1 - \sqrt{3}$

B. $4, 1 + \sqrt{3}$

C. $-4, 1-\sqrt{3}$

D. $-4, 1+\sqrt{3}$

Answer: A

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55. For a $a \leq 0$, determine all real roots of the equation $x^2 - 2a|x-a| - 3a^2 = 0$.

A. $a(1-\sqrt{2}), a(-1+\sqrt{6})$

B. $a(1+\sqrt{2}), a(1-\sqrt{6})$

C. $a(1-\sqrt{2}), a(1-\sqrt{6})$

D. none of these

Answer: A

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56. C-1 If $2 + i\sqrt{3}$ is a root of the equation $x^2 + px + q = 0$, Where p,q $\in$ R, then find the ordered pair (p,q).

A. $p = -4, q = 7$

B. $p = 4, q = 7$

C. $p = 4, q = -7$

D. $p = -4, q = -7$

Answer: A

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57. If $\tan\alpha \tan\beta$ are the roots of the equation $x^2 + px + q = 0 (p \neq 0)$ then

A. $\sin^2(\alpha+\beta) + p\sin(\alpha+\beta)\cos(\alpha+\beta) + q\cos^2(\alpha+\beta) = q$

B. $\tan(\alpha+\beta) = \frac{p}{q+1}$

C. $\cos(\alpha+\beta) = -p$

D. $\sin(\alpha+\beta)=1-q$

Answer: A

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58. Root of the quadratic equation $x^2+6x-2=0$

A. $\alpha^2+5\alpha-8$

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

C. $\frac{2\alpha^2+12\alpha-6}{\alpha}$

D. all of these

Answer: D

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59. If the sum of the roots of the equation $ax^2 + bx + c = 0$ is equal to sum of the squares of their reciprocals, then bc^2, ca^2, ab^2 are in

A. $c^2b, a^2c, b^2 aare \in A.\ P.$

B. $c^2b, a^2c, b^2 aare \in G.\ P.$

C. $\frac{b}{c}, \frac{a}{b}, \frac{c}{a} are \in G.\ P.$

D. $\frac{a}{b}, \frac{b}{c}, \frac{c}{a} are \in G.\ P.$

Answer: A

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60. For real x, the function $(x-a)\frac{x-b}{x-c}$ will assume all real values provided

A. $a \leq c \leq b$

B. $b \geq a \geq c$

C. $b \leq c \leq a$

D. $a \geq b \geq c$

Answer: B

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61. If $a(p+q)^2 + 2bpq + c = 0abda(p+r)^2 + 2bpr + c = 0(a \neq 0)$, then $qr = p^2$ b. $qr = p^2 + \frac{c}{a}$ c. $qr = p^2$ d. none of these

A. $p^2 + \frac{c}{a}$

B. $p^2 + \frac{a}{c}$

C. $p^2 + \frac{a}{b}$

D. $p^2 + \frac{b}{a}$

Answer: A

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62. If the roots of the equation $ax^2 + 2bx + c = 0$ and $-2\sqrt{acx} + b = 0$ are simultaneously real, then prove that $b^2 = ac$

A. a = b, c = 0

B. $ac = b^2$

C. $4b^2 = ac$

D. none of these

Answer: B

Watch Video Solution

63. If a, b, c are real and $x^3 - 3b^2x + 2c^3$ is divisible by x -a and x - b, then (a) a =-b=-c (c) a = b = c or a =-2b-_ 2c (b) a = 2b = 2c (d) none of these

A. a = - b = - c

B. a = 2b = 2c

C. a = b = c or a = - 2b = -2c

D. none of these

Answer: C

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64. if p and q are non zero constants, the equation $x^2 + px + q = 0$ has roots α and β then the equation $qx^2 + px + 1 = 0$ has roots

A. $qx^2 + px + 1 = 0 \text{has roots} \frac{1}{u} \text{ and } \frac{1}{v}$

B. $(x - p)(x + q) = 0 \text{has roots} u + v \text{ and } uv$

C. $x^2 + p^2x + q^2 = 0 \text{has roots} u^2 \text{ and } v^2$

D. $x^2 + qx + p = 0 \text{has roots} \frac{u}{v} \text{ and } \frac{v}{u}$

Answer: A

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65. For the equation $x^{\frac{3}{4}(\log 2x)^2+\log 2(x)-\frac{5}{4}}=\sqrt{2}$ which one of the following is not true?

A. has at least one real solution

B. has exactly three real solutions

C. has exactly one irrational solution

D. all of these

Answer: D

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66. $\cos\alpha$ is a root of the equation `25 x^2+5x-12=0,-1

A. $\frac{12}{25}$

B. $\frac{-12}{25}$

C. $\frac{-24}{25}$

D. $\frac{20}{25}$

Answer: C

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67. If $a+b+c=0$ then check the nature of roots of the equation $4ax^2+3bx+2c=0 where a, b, c \in R$.

A. one positive and one negative root

B. imaginary roots

C. real roots

D. none of these

Answer: C

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68. If $b>a$, then the equation $(x-a)(x-b)-1=0$, has

A. both roots in [a, b]

B. both roots in $(-\infty, a)$

C. roots in $(-\infty, a)$ and other in (b, ∞)

D. both roots in (b, ∞)

Answer: D

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69. The roots of the quadratic equation $(a+b-2c)x^2+(2a-b-c)x+(a-2b+c)=0$ are

A. $a+b+c$ and $a-b+c$

B. $\frac{1}{2}$ and $a-2b+c$

C. $a-2b+c$ and $\frac{1}{a+b-c}$

D. none of these

Answer: D

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70. If a,b,c are positive real numbers, then the number of real roots of the equation $ax^2 + b|x| + c$ is

A. 2

B. 4

C. 0

D. none of these

Answer: C

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71. Real roots of equation $x^2 + 5|x| + 4 = 0$ are

A. $-1, \ -4$

B. 1, 4

C. $-4, 4$

D. none of these

Answer: D

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72. If a and $b(\neq 0)$ are the roots of the equation $x^2 + ax + b = 0$ then the least value of $x^2 + ax + b$ is

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

B. $\frac{9}{4}$

C. $-\frac{9}{4}$

D. 1

Answer: C

Watch Video Solution

73. If f(x) = $\frac{x^2 - 2x + 4}{x^2 + 2x + 4}, x \in R$ then range of function is

A. $[1/3, 3]$

B. $(1/3, 3)$

C. (3, 3)

D. $(-1/3, 3)$

Answer: A

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74. If `a

A. imaginary

B. real

C. one real and imaginary

D. equal and imaginary

Answer: A

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75. If α, β are the roots of the quadratic equation $x^2 + bx - c = 0$, the equation whose roots are b and c, is

A. $x^2 + \alpha x - \beta = 0$

B. $x^2 - x(\alpha + \beta + \alpha\beta) - \alpha\beta(\alpha + \beta) = 0$

C. $x^2 + (\alpha + \beta - \alpha\beta)x - \alpha\beta(\alpha + \beta) = 0$

D. $x^2 + x(\alpha + \beta + \alpha\beta) + \alpha\beta(\alpha + \beta) = 0$

Answer: D

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76. If α and β are the roots of $ax^2 + bx + c = 0$, then the equation $ax^2 - bx(x - 1) + c(x - 1)^2 = 0$ has roots

A. $\frac{\alpha}{1-\alpha}, \frac{\beta}{1-\beta}$

B. $\frac{1-\alpha}{\alpha}, \frac{1-\beta}{\beta}$

C. $\frac{\alpha}{\alpha+1}, \frac{\beta}{\beta+1}$

D. $\frac{\alpha+1}{\alpha}, \frac{\beta+1}{\beta}$

Answer: C

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77. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$, then find the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

A. $3x^2 + 19x + 3 = 0$

B. $3x^2 - 19x + 3 = 0$

C. $3x^2 - 19x - 3 = 0$

D. $x^2 - 16x + 1 = 0$

Answer: B

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78. The expression $y = ax^2 + bx + c$ has always the same sign as of a if $(A)4ac < b^2 (B)4ac > b^2 (C)4ac = b2 (D)ac < b^2$

A. $4ac < b^2$

B. $4ac > b^2$

C. $ac < b^2$

D. $ac > b^2$

Answer: B

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79. If $\alpha, \beta and \gamma$ are the roots of $x^3 + 8 = 0$ then find the equation whose roots are $\alpha^2, \beta^2 and \gamma^2$.

A. $x^3 - 8 = 0$

B. $x^3 - 16 = 0$

C. $x^3 + 64 = 0$

D. $x^3 - 64 = 0$

Answer: D

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80. Given that $ax^2 + bx + c = 0$ has no real roots and $a + b + c < 0$, then $c \neq 0$ b. $c < 0$ c. $c > 0$ d. $c = 0$

A. c = 0

B. $c > 0$

C. $c < 0$

D. c = 0

Answer: C

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81. If $x \in R$, then the expression $9^x - 3^x + 1$ assumes

A. all real values

B. all real values greater than 0

C. all real values greater than 3/4

D. all real values greater than 1/4

Answer: C

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82. The values of 'a' for which the roots of the equation $x^2 + x + a = 0$ are real and exceed 'a' are

A. $0 < a < 1/4$

B. $a < 1/4$

C. $a < -2$

D. $-2 < a < 0$

Answer: C

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83. Let α, β are the roots of $x^2 + bx + 1 = 0$. Then find the equation whose roots are $(\alpha + 1/\beta) and (\beta + 1/\alpha)$.

A. $x^2 = 0$

B. $x^2 + 2bx + 4 = 0$

C. $x^2 - 2bx + 4 = 0$

D. $x^2 - bx + 1 = 0$

Answer: C

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84. The roots α, β and γ of an equation $x^3 - 3ax^2 + 3bx - c = 0$ are in H.P. Then,

A. $\beta = \frac{1}{a}$

B. $\beta = b$

C. $\beta = \frac{b}{c}$

D. $\beta = \frac{c}{b}$

Answer: D

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85. If b and c are odd integers, then the equation $x^2 + bx + c = 0$ has-

A. two odd roots

B. two integer roots, one odd and one even

C. no integer roots

D. none of these

Answer: C

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86. If the equations $ax^2 + bx + c = 0 and x^3 + 3x^2 + 3x + 2 = 0$ have two common roots, then $a = b = c$ b. $a = b \neq c$ c. $a = -b = c$ d. none of these

A. $a = b \neq c$

B. $a = -b = c$

C. $a = b = c$

D. none of these

Answer: C

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87. If both the roots of the equation $ax^2 + bx + c = 0$ are zero, then

A. b = c = 0

B. $b = 0, c \neq 0$

C. $b \neq 0, c = 0$

D. none of these

Answer: A

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88. If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 + x^2 + 1 = 0$ then the equation whose roots are $\alpha^2, \beta^2, \gamma^2, \delta^2$ is

A. $\left(x^2 - x + 1\right)^2 = 0$

B. $\left(x^2 + x + 1\right)^2 = 0$

C. $x^4 - x^2 + 1 = 0$

D. $x^2 + x + 1 = 0$

Answer: B

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89. The number of real roots of $\left(x+\frac{1}{x}\right)^3+x+\frac{1}{x}=0$ is

A. 0

B. 2

C. 4

D. 6

Answer: A

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90. The roots of the equation $(3-x)^4+(2-x)^4=(5-2x)^4$ are

A. all real

B. all imaginary

C. two real and two imaginary

D. none of these

Answer: C

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91. The real roots of the equation $|x|^3 - 3x^2 + 3|x| - 2 = 0$ are

A. 0, 2

B. ± 1

C. ± 2

D. 1, 2

Answer: C

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92. The number of positive integral roots of $x^4 + x^3 - 4x^2 + x + 1 = 0$, is

A. 0

B. 1

C. 2

D. 4

Answer: C

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93. If x, y, z are real and distinct, then $x^2 + 4y^2 + x + 1 = 0$, is

A. non-negative

B. non-positive

C. zero

D. none of these

Answer: A

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94. The number of values of a for which equations $x^3 + ax + 1 = 0 and x64 + ax^2 + 1 = -$ have a common root is 0 b. 1 c. 2 d. Infinite

A. 2

B. -2

C. 0

D. none of these

Answer: B

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95. . For what value of m will the equation $\frac{x^2 - bx}{ax - c} = \frac{m - 1}{m + 1}$ have roots equal in magnitude but opposite in sign?

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

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

C. c

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

Answer: A

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96. the values of a for which $\left(a^2 - 1\right)x^2 + 2(a - 1)x + 2$ is positive for all real x are.

A. $a \geq 1$

B. $a \leq 1$

C. $a > -3$

D. $a \leq -3$ or $a \geq 1$

Answer: D

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97. If α and β are the roots of the equation $x^2 + \sqrt{\alpha}x + \beta = 0$ then the values of α and β are -

A. $\alpha = 1, \beta = -1$

B. $\alpha = 1, \beta = -2$

C. $\alpha = 2, \beta = 1$

D. $\alpha = 2, \beta = -2$

Answer: B

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98. If a, b and c are in AP and if the equations $(b-c)x^2+(c-a)x+(a-b)=0$ and $2(c+a)x^2+(b+c)x+(a-b)$ have a common root, then

A. a^2, b^2, c^2 are in A.P.

B. a^2, c^2, b^2 are in A.P.

C. a^2, c^2, b^2 are in G.P.

D. none of these

Answer: B

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99. If he expression $[mx-1+(1/x)]$ is non-negative for all positive real $x,$ then the minimum value of m must be $-1/2$ b. 0 c. $1/4$ d. $1/2$

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

B. 0

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

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

Answer: C

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100. The set of values of p for which the roots of the equation $3x^2 + 2x + p(p-1) = 0$ are of opposite signs is:

A. $(-\infty, 0)$

B. (0, 1)

C. $(1, \infty)$

D. $(0, \infty)$

Answer: B

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101. Let a, be the roots of the equation $x^2 + x + 1 = 0$. The equation whose roots are α^{19} and β^7 are:

A. $x^2 - x - 1 = 0$

B. $x^2 - x + 1 = 0$

C. $x^2 + x - 1 = 0$

D. $x^2 + x + 1 = 0$

Answer: D

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102. If p and q are the roots of $x^2 + px + q = 0$, then find p.

A. p = 1

B. p = 1 or 0

C. p = -2

D. p = -2 or 0

Answer: B

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103. If p, q, r are positive and are in A.P., the roots of quadratic equation $px^2 + qx + r = 0$ are all real for $\left|\frac{r}{p} - 7\right| \geq 4\sqrt{3}$ b. $\left|\frac{p}{r} - 7\right| \geq 4\sqrt{3}$ c. $allpandr$ d. $nopandr$

A. $\left|\frac{r}{p} - 7\right| \geq 4\sqrt{3}$

B. $\left|\frac{p}{r} - 7\right| < 4\sqrt{3}$

C. all p and r

D. no p and r

Answer: A

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104. If two equation $a_1x^2 + b_1x + c_1 = 0$ and , $a_2x^2 + b_2x + c_2 = 0$ have a common root, then the value of $(a_1b_2 - a_2b_1)(b_1c_2 - b_2c_1)$, is

A. $-(a_1c_2 - a_2c_1)^2$

B. $(a_1a_2 - c_1c_2)^2$

C. $(a_1c_1 - a_2c_2)^2$

D. $(a_1c_2 - c_1a_2)^2$

Answer: D

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105. The value of p for which the difference between the roots of the equation $x^2 + px + 8 = 0$ is 2, are

A. ± 2

B. ± 4

C. ± 6

D. ± 8

Answer: C

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106. If $f(x) = 2x^3 + mx^2 - 13x + n$ and 2 and 3 are 2 roots of the equations f(x)=0, then values of m and n are

A. $-5, \ -30$

B. $-5, 30$

C. 5, 30

D. none of these

Answer: B

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107. If the roots of $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal then $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=$

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: A

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108. If $7^{\log 7\left(x^2-4x+5\right)}=x-1$, x may have values

A. 2, 3

B. 7

C. $-2,\ -3$

D. 2, -3

Answer: A

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109. If α, β are the roots of $ax^2 + bx + c = 0,$ the equation whose roots are $2 + \alpha, 2 + \beta$ is

A. $ax^2 + x(4a - b) + 4a - 2b + c = 0$

B. $ax^2 + x(4a - b) + 4a + 2b + c = 0$

C. $ax^2 + x(b - 4a) + 4a + 2b + c = 0$

D. $ax^2 + x(b - 4a) + 4a - 2b + c = 0$

Answer: D

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110. For the equation $\left|x^2\right| + |x| - 6 = 0$, the sum of the real roots is 1

(b) 0 (c) 2 (d) none of these

A. there is only one root

B. there are only two distinct roots

C. there are only three distinct roots

D. there are four distinct roots

Answer: B

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111. Q. Two students while solving a quadratic equation in x, one copied the constant term incorrectly and got the roots as 3 and 2. The other copied the constant term and coefficient of x^2 as -6 and 1 respectively. The correct roots are :

A. 3, -2

B. $-3, 2$

C. $-6, \ -1$

D. 6, -1

Answer: D

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112. If 8, 2 are roots of the equation$x^2 + ax + \beta$and 3, 3 are roots of $x^2 + \alpha x + b = 0$ then roots of the equation $x^2 + ax + b = 0$ are

A. $8, \ -1$

B. $-9, 2$

C. $-8, \ -2$

D. 9, 1

Answer: D

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113. if one root of the equation $x^2 - x - k = 0$ be square of the other, then k is equal to

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

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

C. $2 \pm \sqrt{5}$

D. $5 \pm \sqrt{2}$

Answer: C

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114. If a and b are the odd integers, then the roots of the equation, $2ax^2 + (2a + b)x + b = 0, a \neq 0$, will be

A. rational

B. irrational

C. non-real

D. none of these

Answer: A

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115. The value of P for which both the roots of the equation $4x^2 - 20Px + \left(25P^2 + 15P - 66\right) = 0$ are less than 2, lies in

A. $(4/5, 2)$

B. $(-1, -4/5)$

C. $(2, \infty)$

D. $(-\infty, -1)$

Answer: D

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116. The value of 'c' for which $\left|\alpha^2 - \beta^2\right| = 7/4$, where α and β are the roots of $2x^2 + 7x + c = 0$, is

A. 4

B. 0

C. 6

D. 2

Answer: C

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117. The value of 'k' for which one of the roots of $x^2 - x + 3k = 0$, is double of one of the roots of $x^2 - x + k = 0$, is

A. 1

B. -2

C. 2

D. none of these

Answer: B

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118. The equation $ax^2 + bx + a = 0$ and $x^3 - 2x^2 + 2x - 1 = 0$ have two root in common,then $(a + b)$ is equal to

A. 1

B. -1

C. 0

D. none of these

Answer: C

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119. The graph of the function $y = 16x^2 + 8(a + 5)x - 7a - 5$ is strictly above the x axis, then 'a' must satisfy the inequality

A. $-15 < a < -2$

B. $-2 < a < -1$

C. $5 < a < 7$

D. none of these

Answer: A

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120. The number of real solutions of the equation $\left(5+2\sqrt{6}\right)^{x^2-3}+\left(5-2\sqrt{6}\right)^{x^2-3}=10$ is-

A. 2

B. 4

C. 6

D. none of these

Answer: B

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121. The number of real roots of the equation $2x^4 + 5x^2 + 3 = 0$, is

A. 4

B. 1

C. 0

D. 3

Answer: C

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122. If x, a, b, c are real and $(x - a + b)^2 + (x - b + c)^2 = 0$, then a, b, c are in

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: C

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123. if the roots of $\left(a^2+b^2\right)x^2-2b(a+c)+\left(b^2+c^2\right)=0$ are equal then a,b,c are in

A. G.P.

B. A.P.

C. H.P.

D. none of these

Answer: A

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124. If a, b, c are all positive and in HP, then the roots of $ax^2+2bx+c=0$ are

A. real

B. imaginary

C. rational

D. equal

Answer: B

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125. If the equation $ax^2 + 2bx - 3c = 0$ has no real roots and $\frac{3c}{4} < a + b$, then

A. $c < 0$

B. $c > 0$

C. $c \geq 0$

D. $c = 0$

Answer: A

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126. If the roots of the equation $x^2 + 2ax + b = 0$ are real and distinct and they differ by at most $2m, thenb$ lies in the interval $(a^2, a^2, +m^2)$ b. $(a^2 - m^2, a62)$ c. $[a^2 - m^2, a^2)$ d. none of these

A. $(a^2 - m^2, a^2)$

B. $[a^2 - m^2, a^2]$

C. $(a^2, a^2 + m^2)$

D. none of these

Answer: B

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127. $\begin{vmatrix} 1 & \cos(\alpha - \beta) & \cos\alpha \\ \cos(\alpha - \beta) & 1 & \cos\beta \\ \cos\alpha & \cos\beta & 1 \end{vmatrix}$

A. $\sin(\alpha+\beta)$

B. $\sin\alpha\sin\beta$

C. $1+\cos(\alpha+\beta)$

D. none of these

Answer: D

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128. If α, β are the roots of the equation $ax^2+bx+c=0$ and $S_n=\alpha^n+\beta^n$ then evaluate $\begin{vmatrix} 3 & 1+s_1 & +s_2 \\ 1+s_1 & 1+s_2 & 1+s_3 \\ 1+s_2 & 1+s_3 & 1+s_4 \end{vmatrix}$

A. $\frac{b^2-4nc}{a^4}$

B. $\frac{(a+b+c)(b^2+4ac)}{a^4}$

C. $\frac{(a+b+c)(b^2-4ac)}{a^4}$

D. $\frac{(a+b+c)^2(b^2-4ac)}{a^4}$

Answer: D

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129. If $a = \frac{\cos(2\pi)}{7} + i\frac{\sin(2\pi)}{7}$, $\alpha = a + a^2 + a^4$, $\beta = a^3 + a^5 + a^6$ then α, β are the roots of the equation

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

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

C. $x^2 - x - 2 = 0$

D. $x^2 + x + 2 = 0$

Answer: D

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130. If $m \in Z$ and the equation $mx^2 + (2m - 1)x + (m - 2) = 0$ has rational roots, then m is of the form

A. $n(n+2), n \in Z$

B. $n(n+1), n \in Z$

C. $n(n-2), n \in Z$

D. none of these

Answer: B

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131. if $(1+k)\tan^2 x - 4\tan x - 1 + k = 0$ has real roots $\tan x_1$ and $\tan x_2$ then

A. $k^2 \leq 5$

B. $k^2 \geq 6$

C. $k = 3$

D. none of these

Answer: A

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132. If the sum of the square of the roots of the equation $x^2 - (\sin\alpha - 2)x - (1 + \sin\alpha) = 0$ is least then $\alpha$is equal to

A. $\pi/4$

B. $\pi/3$

C. $\pi/2$

D. $\pi/6$

Answer: C

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133. p, q, r and s are integers. If the A.M. of the roots of $x^2 - px + q^2 = 0$ and G.M. of the roots of $x^2 - rx + s^2 = 0$ are equal, then

A. q is an odd integer

B. r is an even integer

C. p is an even integer

D. s is an odd integer

Answer: C

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134. If α, β, γ be the roots of $x^3 + a^3 = 0 (a \in R)$, then the number of equation(s) whose roots are $\left(\frac{\alpha}{\beta}\right)^2$ and $\left(\frac{\alpha}{\gamma}\right)^2$, is

A. 1

B. 2

C. 3

D. 6

Answer: A

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135. If α, β are the roots of $ax^2 + c = bx$, then the equation $(a + cy)^2 = b^2 y$ in y has the roots

A. α^{-1}, β^{-1}

B. α^2, β^2

C. $\alpha\beta^{-1}, \alpha^{-1}\beta$

D. $\sqrt{}, \sqrt[3]{}$

Answer: B

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136. If the equations $2x^2 - 7x + 1 = 0$ and $ax^2 + bx + 2 = 0$ have a common root then

A. $a = 2, b = -7$

B. $a = -\frac{7}{2}, b = 1$

C. $a = 4, b = -14$

D. none of these

Answer: C

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137. The common roots of the equation $x^3 + 2x^2 + 2x + 1 = 0$ and $1 + x^{2008} + x^{2003} = 0$ are (where ω is a complex cube root of unity)

A. ω, ω^2

B. $1, \omega^2$

C. $-1, -\omega$

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

Answer: A

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138. If $f(x) = \sum_{k=2}^{n} \left(x - \frac{1}{k-1}\right)\left(x - \frac{1}{k}\right)$, then the product of root of f(x) = 0 as $n \to \infty$, is

A. -1

B. 0

C. 1

D. none of these

Answer: B

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Chapter Test

1. The set of values of a for which $x^2 + ax + \sin^{-1}(x^2 - 4x + 5) + \cos^{-1}(x^2 - 4x + 5) = 0$ has at least one real root is given by

A. $(-\infty, -\sqrt{2\pi}] \cup [\sqrt{2\pi}, \infty)$

B. $(-\infty, -\sqrt{2\pi}) \cup (\sqrt{2\pi}, \infty)$

C. R

D. None of these

Answer: A

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2. The set of possible values of λ for which $x^2 - (\lambda^2 - 5\lambda + 5)x + (2\lambda^2 - 3\lambda - 4) = 0$ has roots whose sum and product are both less than 1 is

A. $(-1, 5/2)$

B. $(1, 4)$

C. $[1, 5/2]$

D. $(1, 5/2)$

Answer: D

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3. The equation $(a+2)x^2+(a-3)x=2a-1, a \neq -2$ has roots rational for

A. all rational values of a except a = -2

B. all real values of a except a = - 2

C. rational values of $a > 1/2$

D. none of these

Answer: A

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4. If $\sin\alpha, \sin\beta$ and $\cos\alpha$ are in G.P then roots of $x^2+2x\cot\beta+1=0$ are always

A. equal

B. real

C. imanginary

D. greater than 1

Answer: B

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5. If α, β are roots of `x^2-3x+a=0,a in Ra n dalpha<1

A. $a \in (-\infty, 2)$

B. $a \in (-\infty, 9/4]$

C. $a \in (2, 9/4]$

D. none of these

Answer: A

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6. If the equations $ax^2 + bx + c = 0$ and $cx^2 + bx + a = 0, a \neq c$ have a negative common root then the value of $a - b + c =$

A. 0

B. 2

C. 1

D. none of these

Answer: A

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7. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in AP, then their common difference is

A. ± 1

B. ± 2

C. ± 3

D. ± 4

Answer: C

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8. If the roots of $a_1x^2 + b_1x + c_1 = 0$ are α_1, β_1 and those of $a_2x^2 + b_2x + c_2 = 0$ are α_2, β_2 such that $\alpha_1\alpha_2 = \beta_1\beta_2 = 1$ then

A. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

B. $\frac{a_1}{c_2} = \frac{b_1}{b_2} = \frac{c_1}{a_2}$

C. $a_1a_2 = b_1b_2 = c_1c_2$

D. none of these

Answer: B

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9. If the roots of the equation $ax^2 - 4x + a^2 = 0$ are imaginary and the sum of the roots is equal to their product, then a^-

A. -2

B. 4

C. 2

D. none of these

Answer: C

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10. If a,b,c are positive real numbers, then the number of positive real roots of the equation $ax^2 + bx + c = 0$ is

A. are real and are in ratio b : ac

B. are real

C. are imaginary and are in ratio $1:\omega$, where ω is a complex cube root of unity

D. are imaginary and are in ratio $-1:\omega$

Answer: C

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11. If the absolute value of the difference of the roots of the equation $x^2+ax+1=0 \text{exceeds} \sqrt{3a}$, then

A. $a \in (-\infty, -1) \cup (4, \infty)$

B. $a \in (4, \infty)$

C. $a \in (-1, 4)$

D. $a \in [0, 4)$

Answer: A

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12. If α, β are roots of the equation $375x^2 - 25x - 2 = 0$ and $S_n = \alpha^n + \beta^n$, then $\lim_{n \in \infty} \sum_{r=1}^{n} S_r$ is equal to

A. $7/116$

B. $1/12$

C. $29/348$

D. none of these

Answer: C

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13. The quadratic equation $x^2 + (a^2 - 2)x - 2a^2$ and $x^2 - 3x + 2 = 0$ have

A. no common root for all $a \in R$

B. exactly one common root for all $a \in R$

C. two common roots for some $a \in R$

D. none of these

Answer: B

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14. If the roots of the equation $ax^2 + bx + c = 0, a \neq 0 (a, b, c$ are real numbers), are imaginary and $a + c < b,$ then

A. $ac > 0$

B. $ab > 0$

C. $bc > 0$

D. exactly two of ab, bc and ca are positive

Answer: A

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15. The value of m for which the equation $x^3 - mx^2 + 3x - 2 = 0$ has two roots equal in magnitude but opposite in sign, is

A. $4/5$

B. $3/4$

C. $2/3$

D. $1/2$

Answer: C

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16. The equation formed by decreasing each root of the equation $ax^2 + bx + c = 0$ by 1 is $2x^2 + 8x + 2 = 0$ then

A. a = - b

B. b = - c

C. c = - a

D. b = a + c

Answer: B

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17. If the roots of the equation $ax^2 - bx - c = 0$ are changed by same quantity then the expression in a,b,c that does not change is

A. $\frac{b^2 - 4ac}{a^2}$

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

C. $\frac{b^2 + 4ac}{a^2}$

D. $\frac{b^2 - 4ac}{a}$

Answer: C

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18. If $x^2 - 2rp_rx + r = 0; r = 1, 2, 3$ are three quadratic equations of which each pair has exactly one root common, then the number of solutions of the triplet (p_1, p_2, p_3) is

A. 1

B. 2

C. 9

D. 27

Answer: B

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19. If $x^2 + px + 1$ is a factor of $ax^3 + bx + c$ then a) $a^2 + c^2 = -ab$ b) $a^2 + c^2 ab$ c) $a^2 - c^2 = ab$ d) $a^2 - c^2 = -ab$

A. $a^2 + c^2 = -ab$

B. $a^2 - c^2 = -ab$

C. $a^2 - c^2 = ab$

D. none of these

Answer: C

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20. If $(x-1)^3$ is a factor of $x^4 + ax^3 + bx^2 + cx - 1 = 0$ then the other factor is

A. x - 3

B. x + 1

C. x + 2

D. x - 1

Answer: B

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21. If α is a root of the equation $x^2 + 2x - 1 = 0$, then prove that $4\alpha^2 - 3\alpha$ is the other root.

A. $3\alpha^3 - 4\alpha$

B. $-2\alpha(\alpha + 1)$

C. $4\alpha^3 - 3\alpha$

D. none of these

Answer: C

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22. If one root of the quadratic equation $(a - b)x^2 + ax + 1 = 0$ is double the other root where $a \in R$, then the greatest value of b is

A. $9/8$

B. $7/8$

C. $8/9$

D. $8/7$

Answer: A

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23. If the equation $ax^2 + bx + c = 0$ and $2x^2 + 3x + 4 = 0$ have a common root, then a : b : c

A. $2:3:4$

B. $1:2:3$

C. $4:3:2$

D. none of these

Answer: A

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24. If the equation $x^3 + ax^2 + b = 0, b \neq 0$ has a root of order 2, then

A. $a^2 + 2b = 0$

B. $a^2 - 2b = 0$

C. $4a^3 + 27b + 1 = 0$

D. $4a^3 + 27b = 0$

Answer: D

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25. If the roots of $x^2 - bx + c = 0$ are two consecutive integers then $b^2 - 4c =$

A. 1

B. 0

C. 2

D. none of these

Answer: A

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26. If the equations $ax^2 + bx + c = 0 and x^3 + 3x^2 + 3x + 2 = 0$ have two common roots, then $a = b = c$ b. $a = b \neq c$ c. $a = -b = c$ d. none of these

A. $a = b \neq c$

B. $a = b = -c$

C. $a = b = c$

D. none of these

Answer: C

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27. Let S denote the set of all real values of a for which the roots of the equation $x^2 - 2ax + a^2 - 1 = 0$ lie between 5 and 10, then S equals

A. $(-1, 2)$

B. (2, 9)

C. (4, 9)

D. (6, 9)

Answer: D

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28. The sum of all the real roots of the equation $|x-2|^2 + |x-2| - 2 = 0$ is

A. 4

B. 3

C. 2

D. 10

Answer: A

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29. The product of the real roots of the equation $|2x+3|^2 - 3|2x+3| + 2 = 0$, is

A. `5//4

B. $5/2$

C. 5

D. 2

Answer: B

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30. If a + b + c = 0 and $a \neq c$ then the roots of the equation $(b+c-a)x^2+(c+a-b)x+(a+b-c)=0$, are

A. real and unequal

B. real and equal

C. imaginary

D. none of these

Answer: A

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31. If $\sec\alpha, \tan\alpha$ are roots of $ax^2+bx+c=0$, then

A. $a^2-b^2+2ac=0$

B. $a^3+b^3+c^3-2abc=0$

C. $a^4+4ab^2c=b^4$

D. none of these

Answer: C

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32. If the roots of the equation $x^3 + bx^2 + 3x - 1 = 0$ form a non-decreasing H.P., then

A. $b \in (-3, \infty)$

B. $b = -3$

C. $b \in (-\infty, -3)$

D. none of these

Answer: B

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33. Let $[x]$ denote the greatest integer less than or equal to x. Then, $\int_0^{1.5} [x]dx = ?$

A. 6

B. 4

C. 2

D. 0

Answer: C

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34. the number of non-zero solutions of the equation $x^2 - 5x - (sgnx)6 = 0$ is.

A. 1

B. 2

C. 3

D. 4

Answer: A

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35. The value of a for which one root of the quadratic equation $\left(a^2-5a+3\right)x^2-(3a-1)x+2=0$ is twice as large as other is

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

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

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

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

Answer: B

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36. If α, β, γ are the roots of the equation $x^3+ax^2+bx+c=0$, then $\alpha^{-1}+\beta^{-1}+\gamma^{-1}=$

A. $\frac{a}{c}$

B. $-\frac{b}{c}$

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

D. $\frac{c}{a}$

Answer: B

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37. If α, β and γ are the roots of $x^3 + qx + r = 0$ then $\sum \frac{\alpha}{\beta + \gamma}$, is

A. 3

B. q+r

C. q/r

D. -3

Answer: D

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38. If α, β are the roots of the equation $ax^2 + bx + c = 0$ then the value of $\left(1 + \alpha + \alpha^2\right)\left(1 + \beta + \beta^2\right)$ is

A. 0

B. positive

C. negative

D. none of these

Answer: B

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39. If α, β are roots of $x^2 \pm px + 1 = 0 and \gamma, \delta$ are the roots of $x^2 + qx + 1 = 0$, then prove that $q^2 - p^2 = (\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta)$.

A. $p^2 - q^2$

B. $q^2 - p^2$

C. p^2

D. q^2

Answer: B

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40. The maximum number of real roots of the equation $x^{2n} - 1 = 0$, is

A. 2

B. 3

C. n

D. 2n

Answer: A

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41. The value of k for which the equation $(k-2)x^2+8x+k+4=0$ has both roots real, distinct and negative, is

A. 0

B. 2

C. 3

D. -4

Answer: C

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42. If $x^{2/3}-7x^{1/3}+10=0$, then the set of values of x, is

A. {12, 5}

B. {8}

C. ϕ

D. {8, 125}

Answer: D

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43. If $x^2 + 2ax + 10 - 3a > 0$ for all $x \in R$ then

A. $-5 < a < 2$

B. $a < -5$

C. $a > 5$

D. $2 < a < 5$

Answer: A

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44. If the difference between the roots of $x^2 + ax + b = 0$ is same as that of $x^2 + bx + a = 0$ $a \neq b$, then:

A. $a + b + 4 = 0$

B. $a + b - 4 = 0$

C. $a - b - 4 = 0$

D. $a - b + 4 = 0$

Answer: A

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45. Product of real roots of the equation $t^2x^2 + |x| + 9 = 0$ a. is always +ve b. is always-ve c. does not exist d. none of these

A. is always positive

B. is always negative

C. does not exist

D. none of these

Answer: D

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46. If the sum of the squares of the roots of the equation $x^2 - (a-2)x - (a+1) = 0$ is least, then the value of a, is

A. 0

B. 2

C. -1

D. 1

Answer: D

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47. If $x^2 = ax + 10 = 0 and x^2 + bx - 10 = 0$ have common root, then $a^2 - b^2$ is equal to 10 b. 20 c. 30 d. 40

A. 10

B. 20

C. 30

D. 40

Answer: D

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48. If $x^2 + px + q = 0$ is the quadratic equation whose roots are $a - 2 and b - 2$ where $a and b$ are the roots of $x^2 - 3x + 1 = 0,$ then $p - 1, q = 5$ b. $p = 1, 1 = -5$ c. $p = -1, q = 1$ d. $p = 1, q = -1$

A. $p = 1, q = 5$

B. $p = 1, q = -5$

C. $p = -1, q = 1$

D. $p = 1, q = -1$

Answer: D

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49. If α and β are the roots of the equation $x^2 - ax + b = 0$ and $A_n = \alpha^n + \beta^n$, then which of the following is true ?

A. $A_{n+1} = aA_n + bA_{n-1}$

B. $A_{n+1} = bA_n + aA_{n-1}$

C. $A_{n+1} = aA_n - bA_{n-1}$

D. $A_{n+1} = bA_n - aA_{n-1}$

Answer: C

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50. $ax^2 + bx + c = 0 (a > 0)$, has two roots α and β such $\alpha < -2$ and $\beta > 2$, then

A. $4 - \frac{2b}{a} + \frac{c}{a} < 0$

B. $4 + \frac{2b}{a} - \frac{c}{a} < 0$

C. $4 - \frac{2b}{a} + \frac{c}{a} = 0$

D. $4 + \frac{2b}{a} + \frac{c}{a} = 0$

Answer: A

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