MATHS

BOOKS - SHRI BALAJI MATHS (ENGLISH)

QUADRATIC EQUATIONS

Exercise Single Choice Problems

1. Sum of values of x and y satisfying the equation $3^x - 4^y = 77, 3^{x/2} - 2^y = 7$ is :

A. 2

B. 3

C. 4

D. 5

Answer: D

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2. If $f(x) = \Pi_{i=1}^{3}(x - a_i) + \sum_{i=1} - 3a_i - 3x$ where $a_i < a_{i+1}$ for i = 1,2, then f(x) = 0 have

A. only one distinct real root

B. exactly two distnict real roots

C. exactly 3 distinet real roots

D. 3 equal real roots

Answer: C

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3. Complete set of real vlaues of 'a' for which the equation $x^4 - 2ax^2 + x + a^2 - a = 0$ has all its roots real :

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

B. $[1. \infty)$

C. $[2, \infty)$

D. $[0, \infty)$

Answer: A

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4. The cubic polynomial with leading coefficient unity all whose roots are 3 units less than the roots of the equation $x^3 - 3x^2 - 4x + 12 = 0$ is denoted as $f(x)$ then $f'(x)$ is equal to :

A. $3x^2 - 12x + 5$

B. `3x ^(2) +12x+5

C. $3x^2 + 12x - 5$

D. $3x^2 - 12x - 5$

Answer: B

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5. The set of vlaue of $k(k \in R)$ for which the equation $x^2 - 4|x| + 3 - |k-1| = 0$ will have exactly four real roots, is:

A. $(-2, 4)$

B. $(-4, 4)$

C. $(-4, 2)$

D. $(-1, 0)$

Answer: A

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6. The number of integers satisfying the inequality is $\frac{x}{x+6} \leq \frac{1}{x}$

A. 7

B. 8

C. 9

D. 3

Answer: A

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7. The product of uncommon real roots of the equation $x^4 + 2x^3 - 8x^2 - 6x + 15 = 0$ and $x^3 + 4x^2 - x - 10 = 0$ is

A. 4

B. 6

C. 8

D. 12

Answer: B

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8. If $\lambda_1, \lambda_2 (\lambda_1 > \lambda_2)$ are two values of λ for which the expression $f(x, y) = x^2 + \lambda xy + y^2 - 5x - 7y + 6$ can be resolved as a product of two linear factors, then the value of $3\lambda_1 + 2\lambda_2$ is

A. 5

B. 10

C. 15

D. 20

Answer: C

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9. If α, β are roots of $ax^3 + bx + c = 0$ then the equation $ax^2 - bx(x-1) + c(x-1)^2 = 0$ has roots

A. $\frac{2\alpha+1}{\alpha-1}, \frac{2\beta+1}{\beta-1}$

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

C. $\frac{\alpha+1}{\alpha-2}, \frac{\beta+1}{\beta-2}$

D. $\frac{2\alpha+3}{\alpha-1}, \frac{2\beta+3}{\beta-1}$

Answer: A

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10. If $a, b \in R$ distinct numbers satisfying $|a-1|+|b-1|=|a|+|b|=|a+1|+|b+1|$, then the minimum value of $|a-b|$ is

A. 3

B. 0

C. 1

D. 2

Answer: D

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11. The set of values of p for which $x^2 - 2px + 3p + 4$ is negative for atleast one real x is

A. 3

B. 4

C. 5

D. 6

Answer: C

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

A. $(1, 2)$

B. $[0, 1]$

C. $(0, 1)$

D. $(-1, 0)$

Answer: C

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13. If 2 lies between the roots of the equation $t^2 - mt + 2 = 0, (m \in R)$ then the value of $\left[\left(\frac{2|x|}{9+x^2}\right)^m\right]$ is:

(where [.] denotes greatest integer function)

A. 0

B. 1

C. 8

D. 27

Answer: A

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14. The number of integral roots of the equation $x^8 - 24x^7 - 18x^5 + 39x^2 + 1155 = 0$ is:

A. 0

B. 2

C. 4

D. 6

Answer: A

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15. If the value of $m^4 + \frac{1}{m^4} = 119$ then the value of $\left|m^3 - \frac{1}{m^3}\right|$=

A. 11

B. 18

C. 24

D. 36

Answer: D

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16. If the equation $ax^2 + 2bx + c = 0$ and $ax^2 + 2cx + b = 0, b \neq c,$ have a common root, then their other roots are the roots of the quadratic equation :

A. $a^2x(x + 1) + 4bc = 0$

B. $a^2x(x + 1) + 8bc = 0$

C. $a^2x(x + 2) + 8bc = 0$

D. $a^2x(1 + 2x) + 8bc = 0$

Answer: D

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17. If $\cos\alpha, \cos\beta$ and $\cos\gamma$ are the roots of the equation $9x^3 - 9x^2 - x + 1 = 0, \alpha, \beta, \gamma \in [0, \pi]$ then the radius of the circle whose centre is $\left(\sum \alpha, \sum \cos\alpha\right)$ and passing through $\left(2\sin^{-1}(\tan\pi/4), 4\right)$ is :

A. 2

B. 3

C. 4

D. 5

Answer: B

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18. For real values of x, the value of expression $\dfrac{11x^2 - 12x - 6}{x^2 + 4x + 2}$

A. lies between -17 and -3

B. does not lie between -17 and -3

C. lies between 3 and 17

D. does not lie between 3 and 17

Answer: B

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19. $\frac{x+3}{x^2-2} \geq \frac{1}{x-4}$ holds for all x satisfying :

A. $-2 < x < 1$ or $x > 4$

B. $-1 < x < 2$ or $x > 4$

C. $x < -1$ or $2 < x < 4$

D. $x > -1$ or $2 < x < 4$

Answer: C

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20. If $x = 4 + 3i$ (where $i = \sqrt{-1}$), then the value of $x^3 - 4x^2 - 7x + 12$ equals:

A. -88

B. $48 + 36i$

C. $-256 + 12i$

D. -84

Answer: A

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21. Let $f(x) = \dfrac{x^2 + x - 1}{x^2 - x + 1}$, then the largest value of $f(x) \forall x \in [-1, 3]$ is:

A. $\dfrac{3}{5}$

B. $\dfrac{5}{3}$

C. 1

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

Answer: B

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22. Let $f(x)=\frac{x^2+x-1}{x^2-x+1}$, In above problem, the range of $f(x)\,\forall x\in[-1,1]$ is:

A. $\left[-1,\frac{3}{5}\right]$

B. $\left[-1,\frac{5}{3}\right]$

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

D. $[-1,1]$

Answer: D

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23. 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. $-2(a^2+b^2)$

B. $(a6(2)+b^2)$

C. $-\left(\frac{a^2+b^2}{2}\right)$

D. $-ab$

Answer: C

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24. IF a root of the equation $a_1x^2+b_1x+c_1=0$ is the reciprocal of the root of the equation $a_2x^2+b_2x+c_2=0,$ then :

A. $(a_1a_2-c_1c_2)^2=(a_1b_2-b_2c_2)(a_2b_1-b_2c_1)$

B. $(a_1a_2-_1b_2)^2=(a_2b_2-b_1c_2)(a_2b_1-b_2c_1)$

C. $(b_1c_2-b_2c_1)^2=(a_1b_2+b_1c_2)(a_2b_1-b_2c_1)$

D. $(b_1c_2 - b_2c_1)^2 = (a_1b_2 + b_1c_2)(a_1b_1 = b_2c_1)$

Answer: A

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25. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation having α/β and β/α as its roots is :

A. A) $3x^2 - 25x + 3 = 0$

B. B) $x^2 + 5x - 3 = 0$

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

D. D) $3x^2 - 19x + 3 = 0$

Answer: D

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26. if the difference of the roots of the equation $x^2 + ax + b = 0$ is equal to the difference of the roots of the equation $x^2 + bx + a = 0$,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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27. If $\tan\theta_1, \tan\theta_2, \tan\theta_3, \tan\theta_4$ are the roots of the equation

$x^4 - (\sin 2\beta)^3 + (\cos 2\beta)x^2 - (\cos\beta)x - \sin\beta = 0$

Then, $\tan(\theta_1 + \theta_2 + \theta_3 + \theta_4)$, is equal to

A. $\sin\beta$

B. $\cos\beta$

C. $\tan\beta$

D. $\cot\beta$

Answer: D

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28. Check that if the roots of the equation $(a^2+b^2)x^2+2x(ac+bd)+c^2+d^2=0$are real,whether they will be equal

A. real and distinct

B. ral and equal

C. imaginary

D. nothing can be said

Answer: C

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29. 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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30. Minimum possible number of positive root of the quadratic equation $x^2 - (1 + \lambda)x + \lambda - 2 = 0, \lambda \in R$

A. 2

B. 0

C. 1

D. can not be determined

Answer: C

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31. Let α, β be real roots of the quadratic equation $x^2 + kx + (k^2 + 2k - 4) = 0$, then the maximum value of $(\alpha^2 + \beta^2)$ is equal to :

A. 12

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

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

D. $\frac{8}{9}$

Answer: D

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32. Polynomial $P(x) = x^2 - ax + 5$ and $Q(x) = 2x^3 + 5x - (a - 3)$ when divided by $x - 2$ have same remainders, then 'a' is equal to

A. 10

B. -10

C. 20

D. -20

Answer: D

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33. If $a and b (\neq b)$ are the roots of the equation $x^2 + ax + b = 0,$ then find the least value of $x^2 + ax + b(x \in R)$.

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

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

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

D. 1

Answer: C

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34. Let α, β be the roots of the equation $ax^2 + bx + c = 0$. A root of the equation $a^3x^2 + abcx + c^3 = 0$ is (i) $\alpha + \beta$ (ii) $\alpha^2 + \beta$ (iii)$\alpha^2 - \beta$ (iv) $\alpha^2\beta$

A. $\alpha + \beta$

B. $\alpha^2 + \beta$

C. $\alpha^2 - \beta$

D. $\alpha^2\beta$

Answer: D

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35. Let a, b, c be the lengths of the sides of a triangle (no two of them are equal) and $k \in R$.If the roots of the equation $x^2 + 2(a+b+c)x + 6k(ab+bc+ac) = 0$ are real, then:

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

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

C. $k > 1$

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

Answer: A

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36. Root(s) of the equatio $9x^2 - 18|x| + 5 = 0$ belonging to the domain of definition of the function $f(x) = \log(x^2 - x - 2)$, 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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37. If $\beta+\cos^2\alpha, \beta+\sin^2\alpha$ are the roots of $x^2+2bx+c=0$ and $\gamma+\cos^4\alpha, \gamma+\sin^4\alpha$ are the roots of $x^2+2Bx+C=0,$ then :

A. $b-B=c-C$

B. $b^2-B^2=c-C$

C. $b^2-B^2=4(c-C)$

D. $(b^2-B^2)=C-C$

Answer: B

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38. The minimum value of the expression $|x-p+|x-15|+|x-p-15|$ for $'x'$ in the range $p \leq x \leq 15$ where `x

A. 30

B. 15

C. 10

D. 0

Answer: B

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39. If the equadratic equation $4x^2 - 2x - m = 0$ and $4p(q-r)x^2 - 2p(r-p)x + r(p-q) \equiv 0$ have a common root such that second equation has equal roots then the vlaue of m will be :

A. 0

B. 1

C. 2

D. 3

Answer: C

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40. The range of k for which the inequality $k\cos^2 x - k\cos x + 1 \geq 0 \forall x \varepsilon (-\infty, \infty)$ is:

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

B. $k > 4$

C. $\frac{1}{2} \leq k \leq 4$

D. $\frac{1}{2} \leq k \leq 5$

Answer: C

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41. If $\frac{1+\alpha}{1-\alpha}, \frac{1+\beta}{1-\beta}, \frac{1+\gamma}{1-\gamma}$ are the cubic equation f(x) = 0 where α, β, γ are the roots of the cubic equation $3x^3 - 2x + 5 = 0$, then the number of negative real roots of the equation f(x) = 0 is :

A. 0

B. 1

C. 2

D. 3

Answer: B

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42. The sum of all intergral values of λ for which $(\lambda^2+\lambda-2)x^2+(\lambda+2)x<1\,\forall x\in R,$ is:

A. -1

B. -3

C. 0

D. -2

Answer: B

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43. If $\alpha,\beta,\gamma,\delta\in R$ satisfy $\dfrac{(\alpha+1)^2+(\beta+1)^2+(\gamma+1)^2+(\delta+1)^2}{\alpha+\beta+\gamma+\delta}=4$ If biquadratic equation $a_0x^4+a_1x^3+a_2x^2+a_3x_a\_4=0$ has the roots

$\left(\alpha+\frac{1}{\beta}-1\right),\left(\beta+\frac{1}{\gamma}-1\right),\left(\gamma+\frac{1}{\delta}-1\right),\left(\delta+\frac{1}{\alpha}-1\right)$. then the value of $\frac{a_2}{a_0}$ is

A. 4

B. -4

C. 6

D. none of these

Answer: C

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44. If the complete set of value of x satisfying $|x-1|+|x-3| \geq (-\infty, a]ii[b, \infty)$, then $a+b=$:

A. 2

B. 3

C. 6

D. 4

Answer: D

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45. If exactly one root of the quadratic equation $x^2 - (a+1)x + 2a = 0$ lies in the interval $(0, 3)$ then the set of value 'a' is given by :

A. $(-\infty, 0) \cup (6, 0)$

B. $(-\infty, 0) \cup (6, \infty)$

C. $(-\infty, 0] \cup [6, \infty)$

D. $(0, 6)$

Answer: B

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46. The condition that the roots of $x^3 + 3px^2 + 3qx + r = 0$ may be in $H.P.$ is

A. $2p^3 - 3pqr + r^2 = 0$

B. $3p6(3) - 2pqr + p^2 = 0$

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

D. $r^3 + 3pqr + 2q^3 = 0$

Answer: C

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47. If x is ral and $4y^2 + 4xy + x + 6 = 0,$ then the complete set of values of x for which y is real, is :

A. $x \leq -2 \text{ or } x \geq 3$

B. $x \leq 2 \text{ or } x \geq 3$

C. $x \leq -3 \text{ or } x \geq 2$

D. $-3 \leq x \leq 2$

Answer: A

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48. The solution of the equation $\log_{\cos x^2}(3-2x) < \log_{\cos x^2}(2x-1)$ is:

A. $(1/2, 1)$

B. $(-\infty, 1)$

C. $(1/2, 3)$

D. $\left(1, \infty - \sqrt{2\pi\pi, } n \in N\right.$

Answer: A

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49. 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. ral and of opposite sign

D. imaginary

Answer: C

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50. Let a,b and c be three distinct real roots of the cubic $x^3+2x^2-4x-4=0$. If the equation $x^3+qx^2+rx+\le=0$ has roots $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$, then the vlaue of $(q+r+s)$ is equal to :

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

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

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

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

Answer: C

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51. Solution set of the inequality, $2 - \log_2(x^2 + 3x) \geq 0$ is-

A. $[-2, 1]$

B. $[-4, -3 \cup (0, 1)$

C. $(-\infty, -3) \cup (1, \infty)$

D. $(-\infty, -4) \cup [1, \infty)$

Answer: B

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52. For what least integral 'k' is the quadratic trinomial $(k-2)x^2+8x+(k+4)$ is positive for all ral values of x ?

A. $k=4$

B. $k=5$

C. $k=3$

D. $k=6$

Answer: B

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53. If roots of the equation $(m-2)x^2-(8-2m)x-(8-3m)=0$ are opposite in sign then the number of integral values of m is/are :

A. A) 0

B. B) 1

C. C) 2

D. D) more than 2

Answer: A

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54. If $\log_{0.6}\left(\log_6\left(\frac{x^2+x}{x+4}\right)\right) < 0,$ then complete set of value of 'x' is:

A. $(-4, -3) \cup (8, \infty)$

B. $(-\infty, -3) \cup (8, \infty)$

C. $(8, \infty)$

D. none of these

Answer: A

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55. Two different real numbers α and β are the roots of the quadratic equation $ax^2 + c = 0a, c \neq 0,$ then $\alpha^3 + \beta^3$ is:

A. a

B. $-c$

C. 0

D. -1

Answer: C

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56. The least integral value of 'k' If $(k-1)x^2 - (k+1)x + (k+1)$ is positive for all real value of x is:

A. A) 1

B. B) 2

C. C) 3

D. D) 4

Answer: B

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57. If $(-2, 7)$ is the highest point on the graph of $y = -2x^2 - 4ax + \lambda$ then λ equals

A. 31

B. 11

C. -1

D. $-1/3$

Answer: C

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58.

If $a+b+c=0, a, b, c \in Q$ then roots of the equation $(b+c-a)x^2+(c+a-c)=0$ are:

Rational

Irrational

Imaginary

none of these .

A. rational

B. irrational

C. imaginary

D. none of these

Answer: A

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59. If two roots of $x^3 - ax^2 + bx - c = 0$ are equal in magnitude but opposite in sign. Then:

A. $a + bc = 0$

B. $a^2 = bc$

C. $ab = c$

D. $a - b + c = 0$

Answer: C

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60. If α and β are the ral 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 $(\alpha \neq \beta, p \neq 0, p, q, r, s \in R)$:

A. one positive and one negative root

B. two positive roots

C. two negative roots

D. can't say anything

Answer: A

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61. If x^2+px+1 is a factor of ax^3+bx+c then a) $a^2+c^2=-ab$ b) a^2+c^2ab c) $a^2-c^2=ab$ d) $a^2-c^2=-ab$

A. A) $a^2+xc^2=-ab$

B. B) $a^2+c^2=ab$

C. C) $a^2-c^2=ab$

D. D) $a^2-c^2=-ab$

Answer: C

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62. In a $\Delta ABC \tan\frac{A}{2}, \tan\frac{B}{2}, \tan\frac{C}{2}$ are in H.P., then the vlaue iof $\cot\frac{A}{2}\cot\frac{C}{2}$ is :

A. 3

B. 2

C. 1

D. $\sqrt{3}$

Answer: A

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63. Let $f(x) = 10 - |x - 10| \forall x \in j[-9, 9]$, if M and m be the maximum and minimum value opf $f(x)$ respectively, then :

A. $M + m = 0$

B. $2M + m = -9$

C. $2M + m = 7$

D. $M = m = 7$

Answer: A

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64. Solution of the quadratic equation $(3|x| - 3)^2 = |x| + 7$, which belongs to the domain of the function $y = \sqrt{(x-4)x}$ is :

A. $\pm \frac{1}{9}, \pm 2$

B. $\frac{1}{9}, 8$

C. $-2, -\frac{1}{9}$

D. $-\frac{1}{9}, 8$

Answer: C

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65.

Number of real solutions of the equation $x^2 + 3|x| + 2 = 0$ is:

i) 0

ii) 2

iii) 3

iv) 4

A. 0

B. 2

C. 3

D. 4

Answer: A

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66. If the roots of $x^2 - bx + c = 0$ are two consecutive integers, then $b^2 - 4c$ is (a)0 (b) 1 (c) 2 (d) none of these

A. 3

B. -2

C. 1

D. 2

Answer: C

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

(a) $\frac{17}{7}$

(b) $\frac{1}{4}$

(c) 41

(d) 1

A. 41

B. 1

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

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

Answer: A

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68. If $\frac{x^2+2x+7}{2x+3} < 6$, x $\in$ R then

A. $x \in \left(-\infty, -\frac{3}{2}\right) \cup (11, \infty)$

B. $x \in (-\infty, -1) \cup (11, \infty)$

C. $x \in \left(-\frac{3}{2}, -1\right)$

D. $x \in \left(-\infty, -\frac{3}{2}\right) \cup (-1, 11)$

Answer: D

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69. If x is real, then range of $\frac{3x-2}{7x+5}$ is :

A. a) $R - \left\{\frac{2}{5}\right\}$

B. b) $R - \left\{\frac{3}{7}\right\}$

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

D. d) $R - \left\{\frac{-2}{5}\right\}$

Answer: B

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70. Let A denotes the set of values of x for which $\frac{x+2}{x-4} \leq 0$ and B denotes the set of values of x for which $x^2 - ax - 4 \leq 0$. If B is the subset of A then a cannot take integral value (a) 0, (b) 1 (c) 2 (d) 3

A. 0

B. 1

C. 2

D. 3

Answer: D

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71. If the quadratic polynomial $P(x) = (p-3)x^2 - 2px + 3p - 6$ ranges from $[0, \infty)$ for every $x \in R$, then the value of p can be:

A. 3

B. 4

C. 6

D. 7

Answer: C

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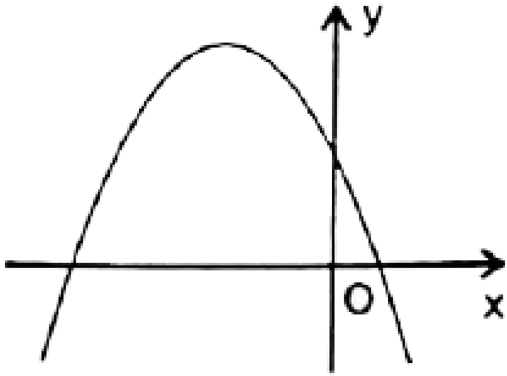
72. If graph of the quadratic $y = ax^2 + bx + c$ is given below :



then:

A. $a < 0, b > 0, c > 0$

B. $a < 0, b > 0, c < 0$

C. $a < 0, b < 0, c > 0$

D. $a < 0, b < 0, c < 0$

Answer: C

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73. If $ax^2 + bx + c = 0$, $a, b, c \in$ R has no real roots, and if

$c <$ 0, the which of the following is ture ?

(a) a $<$ 0 (b) a + b + c gt 0(c) a gt ` 0

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

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

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

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

Answer: C

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74. Minimum value of $y = x^2 - 3x + 5$, $x \in [-4, 1]$ is:

A. 3

B. $\frac{11}{4}$

C. 0

D. 9

Answer: A

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75. If $3x^2 - 17x + 10 = 0$ and $x^2 - 5x + m = 0$ has a common root, then sum of all possible real values of 'm' is:

A. 0

B. $-\frac{26}{9}$

C. $\frac{29}{9}$

D. $\frac{26}{3}$

Answer: C

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76. For real numbers x and y, if $x^2 + xy - y^2 + 2x - y + 1 = 0$, then (a) y can not be between 0 and $\frac{8}{5}$ (b) y can not be between $-\frac{8}{5}$ and $\frac{8}{5}$ (c) y cannnot be between $-\frac{8}{5}$ and 0(d) y cannot be between $-\frac{16}{5}$ and 0

A. a can not be between 0 and $\frac{8}{5}$

B. y can not be between $-\frac{8}{5}$ and $\frac{8}{5}$

C. you can not be between $-\frac{8}{5}$ and 0

D. y can not be between $-\frac{16}{5}$ and 0

Answer: C

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77. If $3x^4 - 6x^3 + kx^2 - 8x - 12$is divisible by $x - 3$, then it is also divisible by :

A. $3x^2 - 4$

B. $3x^2 + 4$

C. $3x^2 + x$

D. $3x^2 - x$

Answer: B

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78. The complete set of values of a so that equation $\sin^4 x + a\sin^2 x + 4 = 0$ has at least one real root is (A) $(-\infty, -5]$ (B) $(-\infty, 4] \cup [4, \infty)$ (C) $(-\infty, -4]$ (D) $[4, \infty)$

A. $(\infty, -5]$

B. $(-\infty, 4] \cup [4, \infty)$

C. $(-\infty. -4]$

D. $[4, \infty)$

Answer: A

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79. Let r, s, t be the roots of the equation $x^3 + ax^2 + bx + c = 0,$ such that $(rs)^2 + (st)^2 + (rt)^2 = b^2 - kac,$ then k =

A. 1

B. 2

C. 3

D. 4

Answer: B

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80. If the roots of the cubic $x^3 + ax^2 + bx + c = 0$ are three consecutive positive integers, then the value of $\frac{a^2}{b+1} =$

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

81. Let 'k' be a real number. The minimum number of distinct real roots possible of the equation $\left(3x^2 + kx + 3\right)\left(x^2 + kx - 1\right) = 0$ is

A. 0

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

82. If r and s are variables satisfying the equation $\frac{1}{r+s}=\frac{1}{r}+\frac{1}{s}$. The value of $\left(\frac{r}{s}\right)^3$ is equal to :

A. 1

B. -1

C. 3

D. not possible to determine

Answer: A

Watch Video Solution

83. Let $f(x)=x^2+ax+b$. If the maximum and the minimum values of f(x) are 3 and 2 respectively for $0 \le x \le 2$, then the possible ordered pair(s) of (a,b) is/are

A. $(-2, 3)$

B. $(-3/2, 2)$

C. $(-5/2, 3)$

D. $(-5/2, 2)$

Answer: A

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84. The equation $|x^2 - x - 6| = x + 2$ has :

A. $-2, 2, 4$

B. $0, 1, 4$

C. $-2, 1, 4$

D. $0, 2, 4$

Answer: A

Watch Video Solution

85. If a, b, c be the sides of ABC and equations $ax^2+bx+c=0$ and $5x^2+12x+13=0$ have a common root, then find $\angle C$.

A. 60°

B. 90°

C. 120°

D. 45°

Answer: B

Watch Video Solution

86. If $\alpha, \beta \text{ and } \gamma$ are three ral roots of the equatin $x^3-6x^2+5x-1=0,$ then the value of $\alpha^4+\beta^4+\gamma^4$ is:

A. 250

B. 650

C. 150

D. 950

Answer: B

Watch Video Solution

87. If one of the values of x of the equation $2x^2 - 6x + k = 0$ be $\frac{1}{2}(a + 5i)$, find the values of a and k.

A. $\alpha = 3, k = 8$

B. $\alpha = \frac{3}{2}, k = 17$

C. $\alpha = -3, k = -17$

D. $\alpha = 3, k = 17$

Answer: D

Watch Video Solution

88. Let x_1 and x_2 be the real roots of the equation $x^2 - (k-2)x + \left(k^2 + 3k + 5\right) = 0$ then the maximum value of $x_1^2 + x_2^2$ is

A. 19

B. 18

C. $\dfrac{50}{9}$

D. non-existent

Answer: B

Watch Video Solution

89. The set of value of a for which $(a-1)x^2(a+1)x + a - 1 \geq 0$ is true for all $x \geq 2$ is (a) $(-\infty, 1)$ b. $\left(1, \dfrac{7}{3}\right)$ c. $\left(\dfrac{7}{3}, \infty\right)$ d. none of these

A. $\left(\dfrac{3}{7}, 1\right]$

B. $(-\infty, 1)$

C. $\left(-\infty, \frac{7}{3}\right]$

D. $\left[\frac{7}{3}, \infty\right)$

Answer: D

Watch Video Solution

90. If α, β be the roots of $4x^2 - 17x + \lambda = 0, \lambda \in R$ such that $1 < \alpha < 2$ and $2 < \beta < 3$ then the number of integral values of λ is `

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

91. Assume that p is a ral number. In order of $\sqrt[3]{x+3p+1}-\sqrt[3]{x}=1$ to have real solutions, it is necessary that:

A. $p \geq 1/4$

B. $p \geq -1/4$

C. $p \geq 1/3$

D. $p \geq -1/3$

Answer: B

Watch Video Solution

92. If α, β ar the roots of the quadratic equation $x^2-\left(3+2^{\sqrt{\log_2 3}}-3^{\sqrt{\log_3 2}}\right)x-2\left(3^{\log_3 2}-2^{\log_z 3}\right)=0,$ then the value of $\alpha^2+\alpha\beta+\beta^2$ is equal to :

A. 3

B. 5

C. 7

D. 11

Answer: C

Watch Video Solution

93. If m is the minimum value of $f(x, y) = x^2 - 4x + y^2 + 6y$ when $x and y$ are subjected to the restrictions $0 \leq x \leq 1 and 0 \leq y \leq 1,$ then the value of $|m|$ is_______

A. -1

B. -2

C. -3

D. -5

Answer: C

Watch Video Solution

94. The expression $ax^2 + 2bx + c$, where 'a' is non-zero real number, has same sign as that of 'a' for every real value of x,then roots of quadratic equation $ax^2 + (b - c)x - 2b - c - a - 0$ are: (a) real and equal (b) real and unequal (c) non-real having positive real part(d) non-real having negative real part

A. ral and equal

B. real and unequal

C. non-real having positive ral part

D. non-real having negative real part

Answer: B

Watch Video Solution

95. Let a,b and c be the roots of $x^3 - x + 1 = 0$, then the ralue of $\left(\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}\right)$ equals to :

A. 1

B. -1

C. 2

D. -2

Answer: D

Watch Video Solution

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

(a) 2

(b) 3

(c) 4

(d) infinite

A. 2

B. 3

C. 4

D. infinite

Answer: B

Watch Video Solution

97.

The number of integral values which can be taken by the expression, $f(x)=\frac{x^3-1}{(x-1)(x^2-x+1)}$ for $x\in R$, is:

1

2

3

infinite

A. A) 1

B. B) 2

C. C) 3

D. D) infinite

Answer: B

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98. The comlete set of values of m for which the inequality $\frac{x^2 - mx - 2}{x^2 + mx + 4} > -1$ is satisfied $aax \in R,$ is :

A. $m = 0$

B. $-1 < m < 1$

C. $-2 < m < 2$

D. $-4 < m < 4$

Answer: D

Watch Video Solution

99. If the quadratic polynomials defined on real coefficient $P(x) = a_1x^2 + 2b_1x + c_1$ and $Q(x) = a_2x^2 + 2b_2x + c_2$ take positive values $\forall x \in R$, what can we say for the trinomial $g(x) = a_1a_2x^2 + b_1b_2x + c_1c_2$?

A. $f(x) < 0 \forall x \in R$

B. $f(x) > 0 \forall x \in R$

C. $f(x)$ takes both positive and negativce values

D. Nothing can be said about $f(x)$

Answer: B

Watch Video Solution

100. If the equation $x^2 + 4 + 3\cos(ax + b) = 2x$ has atleast one solution where $a, b \in [0, 5]$, the value of (a+b) equal to

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

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

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

D. π

Answer: D

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101. Let α, β be the roots of $x^2 - 4x + A = 0$ and γ, δ be the roots of $x^2 - 36x + B = 0$ .If $\alpha, \beta, \gamma, \delta$ form an increasing G.P. and $A^t = B$, then value of 't' equals:

A. 4

B. 5

C. 6

D. 8

Answer: B

Watch Video Solution

102. How many roots does the following equation possess $3^{|x|}\{|2-|x||\}=1$?

A. 2

B. 3

C. 4

D. 6

Answer: C

Watch Video Solution

103. If $\tan\alpha$ is equal to the integral solution of the inequality $4x^2-16x+15<0$ and $\cos\beta$ is equal to the slope of the bisector of the first quadrant, then $\sin(\alpha+\beta)\sin(\alpha-\beta)$ is equal to $\frac{3}{5}$ (b) $\frac{3}{5}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{4}{5}$

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

B. $-\frac{4}{5}$

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

D. 3

Answer: B

Watch Video Solution

104. Consider the function $f_1(x) = x$ and $f_2(x) = 2 + \log_e x, x > 0$, where e is the base of natural logarithm, The graphs of the functions intersect:

A. once in $(0, 1)$ and never in $(1, \infty)$

B. once in $(0, 1)$ and once in (e^2, ∞)

C. once in $(0, 1)$ and one in (e, e^2)

D. more than twice in $(0, \infty)$

Answer: C

Watch Video Solution

105. The sum of all the real roots of equation $x^4 - 3x^3 - 2x^2 - 3x + 1 = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

106. If $\alpha, \beta(\alpha < \beta)$ are the real roots of equation $x^2 - (k+4)x + k^2 - 12 = 0$ such theta $4 \in (\alpha, \beta)$, then the number of integral value of k is equal to

A. 4

B. 5

C. 6

D. 7

Answer: D

Watch Video Solution

107. Let α, β be ral roots of the quadratic equation $x^2 + kx + (k^2 + 2k - 4) = 0$, then the minimum value of $\alpha^z + \beta^z$ is equal to :

A. 9

B. 10

C. 11

D. 12

Answer: D

Watch Video Solution

108. Let $f(x) = a^x - x \ln a$, a>1. Then the complete set of real values of x for which $f'(x) > 0$ is

A. $(1, \infty)$

B. $(-1, \infty)$

C. $(0, \infty)$

D. $(0, 1)$

Answer: C

Watch Video Solution

109. If a,b and c are the roots of the equation $x^3 + 2x^2 + 1 = 0$, find $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$.

A. 8

B. -8

C. 0

D. 2

Answer: A

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110. Let α, β are two real roots of equation $x^2 + px + q = 0, p, q, \in R, q \neq 0$. If the quadratic equation $g(x) = 0$ has two roots $\alpha + \frac{1}{\alpha}, \beta + \frac{1}{\beta}$ such that sum of its roots is equal to product of roots, then number of integral values g can attain is :

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

B. $\left(\frac{1}{3}, 3\right]$

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

D. $\left(-\infty, \frac{1}{3}\right) \cup [3, \infty)$

Answer: A

Watch Video Solution

111. If the equation ln $\left(x^2+5x\right)-\ln(x+a+3)=0$ has exactly one solution for x, then possible integral value of a is:

A. 4

B. 5

C. 6

D. 7

Answer: B

Watch Video Solution

112. Let $f(x) = x^2 + \frac{1}{x^2} - 6x - \frac{6}{x} + 2,$ then minimum value of $f(x)$ is:

A. -2

B. -8

C. -9

D. -12

Answer: C

Watch Video Solution

113. If $x^2 + bx + b$ is a factor of $x^3 + 2x^2 + 2x + c(c \neq 0),$ then $b - c$ is :

A. 2

B. -1

C. 0

D. -2

Answer: C

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114. If roots of $x^3 + 2x^2 + 1 = 0$ are α, β and γ, then the vlaue of $(\alpha\beta)^3 + (\beta\gamma)^3 + (\alpha\gamma)^3$, is :

A. -11

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

115. How many roots does the following equation possess $3^{|x|}\{|2-|x|\ \ |\}=1$?

A. 2

B. 3

C. 4

D. 6

Answer: C

Watch Video Solution

116. The sum of all the roots of equation $x^4-3x^3-2x^2-3x+1=0$ is :

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

117. If α and β are the roots of the quadratic equation $4x^2 + 2x - 1 = 0$ then the value of $\sum_{r=1}^{\infty} (a^r + \beta^r)$ is :

A. 2

B. 3

C. 6

D. 0

Answer: D

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118. The number of value(s) of x satisfying the equation $(2011)^x + (2012)^x + (2013)^x - (2014)^x = 0$ is/are :

A. exactly 2

B. exactly 1

C. more than one

D. 0

Answer: B

Watch Video Solution

119. If $\alpha, \beta(\alpha < \beta)$ are the real roots of the equation $x^2 - (k+4)x + k^2 - 12 = 0$ such that $4 \in (\alpha, \beta)$, then the number of integral values of k equal to :

A. 4

B. 5

C. 6

D. 7

Answer: D

Watch Video Solution

120. Let α, β be real roots of the quadratic equatin $x^2 + kx + (k^2 + 2k - 4) = 0$, then the maximum value of $(\alpha^2 + \beta^2)$ is equal to :

A. 9

B. 10

C. 11

D. 12

Answer: D

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121. The set of value of a for which $(a-1)x^2(a+1)x+a-1 \geq 0$ is true for all $x \geq 2$ is (a) $(-\infty, 1)$ b. $\left(1, \frac{7}{3}\right)$ c. $\left(\frac{7}{3}, \infty\right)$ d. none of these

A. $(-\infty, 1)$

B. $\left[\frac{7}{3}, \infty\right)$

C. $\left[\frac{3}{7}, \infty\right)$

D. none of these

Answer: B

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122. If the equation $x^2+ax+12=0$, $x^2+bx+15=0$ and $x^2+(a+b)x+36=0$ have a common positive root, then $b-2a$ is equal to

A. -6

B. 22

C. 6

D. -22

Answer: C

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123. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

A. infinite number of real roots

B. no real root

C. exactly one real root

D. exactly four real roots

Answer: B

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124. The difference between the maximum and minimum value of the function $f(x) = 3\sin^4 x - \cos^6 x$ is :

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

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

C. 3

D. 4

Answer: D

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125. If α, β are the roots of $x^2 - 3x + a = 0, a \in R$ and $< 1 < \beta$, then find the values of a

A. $\lambda \in \left(2, \frac{9}{4}\right]$

B. $\lambda \in \left(-\infty, \frac{9}{4}\right]$

C. $\lambda \in (2, \infty)$

D. $\lambda \in (-\infty, 2)$

Answer: D

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126. If $2x^2 + 5x + 5x + 7 = 0$ and $ax^2 + + bx + c = 0$ have at least one root common such that $a, b, c \in \{1, 2, \ldots\ldots, 100\}$, then the difference between the maximum and minimum vlaues of $a + b + c$ is:

A. 196

B. 284

C. 182

D. 126

Answer: C

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127. Two particles, A and B, are in motion in the xy-plane. Their co-ordinates at each instant of time $t(t \geq 0)$ are given by $x_A = t, y_A = 2t, x_B = 1 - t$ and $y_B = t.$ The minimum distance between particles A and B is :

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

B. $\frac{1}{\sqrt{5}}$

C. 1

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

Answer: B

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128. If $a \neq 0$ and the equation $ax^2 + bx + c = 0$ has two roots α and β such thet $\alpha < -3$ and $\beta > 2.$ Which of the following is always true ?

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

B. $a(a + |b| + c) < 0$

C. $9a - 3b + c > 0$

D. $(9a - 3b + c)(4a + 2b + c) < 0$

Answer: B

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129. The number of negative real roots of the equation $\left(x^2 + 5x\right)^2 - 24 = 2\left(x^2 + 5x\right)$ is :

A. 4

B. 3

C. 2

D. 1

Answer: B

Watch Video Solution

130. The number of real values of x satisfying the equation $3|x-2|+|1-5x|+4|3x+1|=13$ is:

A. 1

B. 4

C. 2

D. 3

Answer: C

Watch Video Solution

131. If $\log_{\cos x}\sin x \geq 2$ and $x \in [0, 3\pi]$ then $\sin x$ lies in the interval

A. $\left[\frac{\sqrt{5}-1}{2}, 1\right]$

B. $\left[0\frac{\sqrt{5}-1}{2}\right]$

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

D. none of these

Answer: B

Watch Video Solution

132. Let $f(x) = x^2 + bx + c,$ minimum value of $f(x)$ is -5, then abosolute value of the difference of the roots of $f(x)$ is :

A. 5

B. $\sqrt{20}$

C. $\sqrt{15}$

D. Can't be determined

Answer: B

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133. Sum of all the solutions of the equation $|x - 3| + |x + 5| = 7x,$ is :

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

B. $\frac{8}{7}$

C. $\frac{58}{63}$

D. $\frac{8}{45}$

Answer: B

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134. Let $f(x) = x^2 + \frac{1}{x^2} - 6x - \frac{6}{x} + 2,$ then minimum value of $f(x)$ is:

A. -2

B. -8

C. -9

D. -12

Answer: C

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135. If $a+b+c=1$, $a^2+b^2+c^2=9$ and $a^3+b^3+c^3=1$, then $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$ is (i)0 (ii)-1 (iii)1 (iv)3

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

B. 5

C. 6

D. 1

Answer: D

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136. If roots of $x^3+2x^2+1=0$ are α, β and γ, then the vlaue of $(\alpha\beta)^3+(\beta\gamma)^3+(\alpha\gamma)^3$, is :

A. -11

B. 3

C. 0

D. -2

Answer: B

Watch Video Solution

137. If x^2+bx+b is a factor of $x^3+2x^2+2x+c(c\ne0)$, then $b-c$ is :

A. 2

B. -1

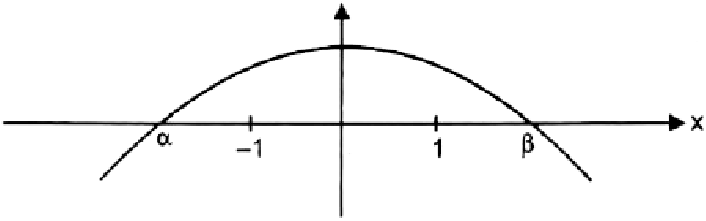
C. 0

D. -2

Answer: C

Watch Video Solution

138. The graph of quadratic polynomical $f(x) = ax^2 + bx + c$ is shown below



A. $\frac{c}{a}|\beta - \alpha| < -2$

B. $f(x) > 0 \forall x > \beta$

C. $ac > 0$

D. $\frac{c}{a} > -1$

Answer: A

Watch Video Solution

139. If $f(x) = \frac{x^2 - 3x + 4}{x^2 + 3x + 4}$, then complete solution of $0 < f(x) < 1$, is :

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

B. $(0, \infty)$

C. $(-\infty, 0)$

D. $(0, 1) \cup (2, \infty)$

Answer: B

Watch Video Solution

140. If α, β, γ are the roots of the equation $x^3 + 2x^2 - x + 1 = 0$, then vlaue of $\frac{(2-\alpha)(2-\beta)(2-\gamma)}{(2+\alpha)(2+\beta)(2+\gamma)}$ is :

A. 5

B. -5

C. 10

D. $\frac{5}{3}$

Answer: B

Watch Video Solution

141. If α and β are roots of the quadratic equation $x^2 + 4x + 3 = 0$, then the equation whose roots are $2\alpha + \beta$ and $\alpha + 2\beta$ is :

A. $x^2 - 12x + 35 = 0$

B. $x^2 + 12x - 33 = 0$

C. $x^2 - 12x - 33 = 0$

D. $x^2 + 12x + 35 = 0$

Answer: D

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142. If a,b,c are real distinct numbers such that $a^3 + b^3 + c^3 = 3abc$, then the quadratic equation $ax^2 + bx + c = 0$ has (a) Real roots (b) At least one negative root (c) Both roots are negative (d) Non real roots

A. Real roots

B. At least one negative root

C. Both roots are negative

D. Non real roots

Answer: A

Watch Video Solution

143. If the equation $x^2 + ax + 12 = 0, x^2 + bx + 15 = 0$ and $x^2 + (a + b)x + 36 = 0$ have a common positive root, then $b - 2a$ is equal to

A. -6

B. 22

C. 6

D. -22

Answer: C

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144. Consider the equation $x^3 - ax^2 + bx - c = 0$, where a,b,c are rational number, $a \neq 1$. it is given that x_1, x_2 and x_1x_2 are the real roots of the equation. Then $x_1x_2\left(\frac{a+1}{b+c}\right) =$

A. 1

B. 2

C. 3

D. 4

Answer: A

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145. The set of value of a for which $(a-1)x^2(a+1)x+a-1\geq 0$ is true for all $x\geq 2$ is (a) $(-\infty, 1)$ b. $\left(1, \frac{7}{3}\right)$ c. $\left(\frac{7}{3}, \infty\right)$ d. none of these

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

B. $\left[\frac{7}{3}, \infty\right)$

C. $\left[\frac{3}{7}, \infty\right)$

D. none of these

Answer: B

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146. The number of real solutions of the equation $|x^2|-3|x|+2=0$ is

(a) 3 (b) 4 (c) 1 (d) 3.

A. 2

B. 4

C. 1

D. 3

Answer: B

Watch Video Solution

147. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

A. infinite number of real roots

B. no real root

C. exactly one real root

D. exactly four real roots

Answer: B

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148. If α, β are the quadratic equation $x^2 - 2(1 - \sin 2\theta)x - 2\cos^2 2\theta = 0, (\theta \in R)$ then the minimum value of $(\alpha^2 + \beta^2)$ is equal to :

A. -4

B. 8

C. 0

D. 2

Answer: C

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149. If the equation $|\sin x|^2 + |\sin x| + b = 0$ has two distinct roots in $[0, \pi][$ then the number of integers in the range of b is equal to:

A. 0

B. 1

C. 2

D. 3

Answer: D

Watch Video Solution

150. If $a \neq 0$ and the equation $ax^2 + bx + c = 0$ has two roots α and β such thet $\alpha < -3$ and $\beta > 2$. Which of the following is always true ?

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

B. $a(a + |b| + c) < 0$

C. $9a - 3b + c > 0$

D. $(9a - 3b + c)(4a + 2b + c) < 0$

Answer: B

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

A. $q + r$

B. $q - r$

C. $-(q + r)$

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

Answer: C

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152. The solution set of the equation

$\log_{1/3}\left(2^{x+2} - 4^x\right) \geq -2$, is

A. $(-\infty, 2)$

B. $\left(-\infty, 2 + \sqrt{13}\right)$

C. $(2, \infty)$

D. none of these

Answer: A

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Exercise One Or More Than One Answer Is Are Correct

1. If S is the set of all real x such that $\frac{2x-1}{2x^3+3x^2+x}$ is $\left(-\infty, -\frac{3}{2}\right)$ b. $\left(-\frac{3}{2}, \frac{1}{4}\right)$ c. $\left(-\frac{1}{4}, \frac{1}{2}\right)$ d. $\left(\frac{1}{2}, 3\right)$ e. None of these

A. $\left(-\infty, -\frac{3}{2}\right)$

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

C. $\frac{-1}{2}, 0\Big)$

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

Answer: A::B::D

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2. If $kx^2 - 4x + 3k + 1 > 0$ for atleast one $x > 0$, then if $k \in S$ contains :

A. $(1, \infty)$

B. $(0, \infty)$

C. $(-1, \infty)$

D. $\left(-\frac{1}{4}, \infty\right)$

Answer: A

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3. Sum of integral roots of the equation $|x^2 - x - 6| = x + 2$ is

A. two positive roots

B. two real roots

C. three real roots

D. four real roots

Answer: A::C

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4. If the roots of the equation $x^2 - ax - b = 0 (a, b, \in R)$ are both lying between -2 and 2, then :

A. $|a| < 2 - \frac{b}{2}$

B. $|a| > 2 - \frac{b}{2}$

C. $|a| < 4$

D. $|a| > \frac{b}{2} - 2$

Answer: A::C::D

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5. Consider the equation is real number x and a real parameter $\lambda, |x-1|-|x-2|+|x-4|=\lambda$ Then for $\lambda \geq 1,$ the number of solutions, the equation can have is/are :

A. 1

B. 2

C. 3

D. 4

Answer: A::B::C::D

Watch Video Solution

6. If a and b are two distinct non-zero real numbers such that $a-b=\frac{a}{b}=\frac{1}{b}-\frac{1}{a},$ then : (a) $a>0$ (b) $a<0$ (c) $b<0$ (d) $b>0$

A. $a>0$

B. $a<0$

C. $b < 0$

D. $b > 0$

Answer: A::C

Watch Video Solution

7. Let

$f(x) = ax^2 + bx + c, a > \; =$ and $f(2-x) = f(2+x) \forall x \in R$ and $f(x$

has 2 distinct real roots, then which of the following is true ?

A. Atleast one roots must be positive

B. $f(2) < f(0) > f(1)$

C. Vertex of graph of $y = f(x)$ is negative

D. Vertex of graph of $y = f(x)$ lies in 3rd quadrat

Answer: A::B::C

Watch Video Solution

8. If exactely two integers lie between the roots of equatin $x^2 + ax - 1 = 0$. Then integral value (s) of 'a' is/are :

A. -1

B. -2

C. 1

D. 2

Answer: A::C

Watch Video Solution

9. If the minimum value of the quadratic expression $y = ax^2 + bx + c$ is negative attained at negative vlaue of x, then :

A. $a > 0$

B. $b > 0$

C. $c > 0$

D. $D > 0$

Answer: A::B::D

Watch Video Solution

10. The quadratic expression $ax^2 + bx + c > 0 \forall x \in R,$ then :

A. $13a - 5b + 2c > 0$

B. $13a - b + 2c > 0$

C. $c > 0, D < 0$

D. $a + c > b, D < 0$

Answer: A::B::C::D

Watch Video Solution

11. The sum of all possible integral value of 'k' for which $5x^2 - 2kx + 1 < 0$ has exactly one integral solution :

A. 2

B. 3

C. 5

D. 7

Answer: A::C

Watch Video Solution

12. If the equation $x^2 + px + q = 0$, the coefficient of x was incorrectly written as 17 instead of 13. Thetn roots were found to be -2 and -15. Then correct roots are :

A. $15, -2$

B. $-3, -10$

C. $-5, 15$

D. $-10, 5$

Answer: B::D

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13. If x is real and $x^2 - 3x + 2 > 0, x^2 - 3x - 4 \leq 0,$ then which one of the following is correct?

A. $|x| \leq 2$

B. $2 \leq x \leq 4$

C. $-1 \leq x \leq 1$

D. $2 < x \leq 4$

Answer: C::D

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14. If $5^{x}+(2\sqrt{3})^{2x}-169\leq 0$ is true for x lying in the interval :

A. $(-\infty, 2)$

B. $(0, 2)$

C. $(2, \infty)$

D. $(0, 4)$

Answer: A::B

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15. Let $f(x)=x^{2}+ax+b$ and $g(x)=x^{2}+cx+d$ be two quadratic polynomials with real coefficients and satisfy $ac=2(b+d)$. Then which of the following is (are) correct ?

A. Exactly one of either $f(x)=0 \text{ or } g(x)=o$ must have real roots.

B. Atleast one of either $f(x)=0 \text{ or } g(x)=0$ must have real roots.

C. Both $f(x)=0 \text{ and } g(x)=0$ must have real roots.

D. Both $f(x) = 0$ and $g(x) = 0$ must have imaginary roots.

Answer: B

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16. The expression $\dfrac{1}{\sqrt{x + 2\sqrt{x-1}}} + \dfrac{1}{\sqrt{x - 2\sqrt{x-1}}}$ simplifies to:

A. $\dfrac{2}{3-x} \quad \text{if} \quad 1 < x < 2$

B. $\dfrac{2}{2-x} \quad \text{if} \quad 1 < x < 2$

C. $\dfrac{2\sqrt{x-1}}{(x-2)} \quad \text{if} \quad x > 2$

D. $\dfrac{2\sqrt{x-1}}{(x+2)} \quad \text{if} \quad x > 2$

Answer: B::C

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17. if allvalues of x which satisfies the inequality $\log_{(1/3)}(x^2 + 2px + p^2 + 1) \geq 0$ also satisfy the inequality $kx^2 + kx - k^2 \leq 0$ for all real values of k, then all possible values of p lies in the interval :

A. $[-1, 1]$

B. $[0, 1]$

C. $[0, 2]$

D. $[-2, 0]$

Answer: A::B::C

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18. If (a, 0) is a point on a diameter of the circle $x^2 + y^2 = 4$, then the equation $x^2 - 4x - a^2 = 0$ has

A. Exactly one real root in $[-1, 0]$

B. Exactly one real root in $[2, 5]$

C. Distinct roots greater than -1

D. Distinct roots less than 5

Answer: A::B::C::D

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19. Let $x^2 - px + q = 0,$ where $p \in R, q \in R$ have the roots α, β such that $\alpha + 2\beta = 0$ then - (i) $2p^2 + q = 0$ (ii) $2q^2 + p = 0$ (iii)$q < 0$ (iv) none of these

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

B. $2q^3 + p = 0$

C. $q < 0$

D. $q > 0$

Answer: A::C

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20. If a, b, c are positive numbers such that $a > b > c$ and the equation $(a+b-2c)x^2 + (b+c-2a)x + (c+a-2b) = 0$ has a root in the interval $(-1, 0)$, then

A. $a + c < 2b$

B. both roots are rational

C. $ax^2 + 2bx + c = 0$ have both roots negative

D. $cx^2 + 2bx + a = 0$ have both roots negative

Answer: A::B::C::D

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21. For the quadratic polynomial $f(x) = 4x^2 - 8ax + a.$ the statements (s) which hold good is/are:

A. There is only one integral 'a' gor which f (x) is non- negative $\forall x \in R$

B. For $a < 0$, the number zero lies between the zeroes of the polynomial

C. $f(x) = 0$ has two distinct solutions in $(0, 1)$ for $a \in \left(\frac{1}{7}, \frac{4}{7}\right)$

D. The minimum value of $f(x)$ for minimum value of a for which f (x) is non-negative $\forall x \in R$ is 0

Answer: A::B::C::D

Watch Video Solution

22. Given a,b, c are three distinct real numbers satisfying the inequality $a - 2b + 4c > 0$ and the equation $ax^2 + bx + c = 0$ has no real roots. Then the possible value (s) of $\frac{4a + 2b + c}{a + 3b + 9c}$ is/are:

A. 2

B. -1

C. 3

D. $\sqrt{2}$

Answer: A::C::D

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23. Let $f(x) = x^2 - 4x + c \forall x \in R,$ where c is a real constant, then which of the following is/are true ?

A. $f(0) > f(1) > f(2)$

B. $f(2) > f(3) > f(4)$

C. $f(1) < f(4) < f(-1)$

D. $f(0) = f(4) > f(3)$

Answer: A::C::D

Watch Video Solution

24. If $0 < a < b < c$ and the roots α, β of the equation $ax^2 + bx + c = 0$ are non-real complex numbers, then

A. $|\alpha| = |\beta|$

B. $|\alpha| > 1$

C. $|\alpha| < 1$

D. $|\alpha| = 1$

Answer: A::B

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25.

If x satisfies $|x-1| + |x-2| + |x-3| > 6,$ then :

i)x ∈ (−∞,1)

ii)x ∈ (−∞,0)

iii)x ∈ (4,∞)

iv) x ∈ (2,∞)

A. $x \in (-\infty, 1)$

B. $x \in (-\infty, 0)$

C. $x \in (4, \infty)$

D. $x \in (2, \infty)$

Answer: B::C

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26. If both roots of the quadratic equation $ax^2 + x + b - a = 0$ are non real and $b > -1$, then which of the following is/are correct ? (a) $a > 0$ (b) $a < b$ (c) $3a > 2 + 4b$ (d) $3a < 2 + 4b$

A. $a > 0$

B. $a < b$

C. $3a > 2 + 4b$

D. $3a < 2 + 4b$

Answer: A::B

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27. If a,b are two numbers such that $a^2 + b^2 = 7$ and $a^3 + b^3 = 10$, then :

A. The greatest value of $|a + b| = 5$

B. The greatest value of $(a + b)$ is 4

C. The leatest value of $|a + b|$ is 1

D. The least vlaue of $|a + b|$ is 1

Answer: A::B::C

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28. The number of non-negative integral ordered pair(s) (x, y) for which $(xy-7)^2 = x^2 + y^2$ holds is greater than or equal to :

A. 1

B. 2

C. 3

D. 4

Answer: A::B::C::D

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29. If α, β, γ and δ are the roots of the equation $x^4 - bx - 3 = 0$, then an equation whose roots are $\frac{\alpha+\beta+\gamma}{\delta^2}, \frac{\alpha+\beta+\delta}{\gamma^2}, \frac{\alpha+\delta+\gamma}{\beta^2}$, and $\frac{\delta+\beta+\gamma}{\alpha^2}$, is:

A. $3x^4 + bx + 1 = 0$

B. $3x^4 - bx + 1 = 0$

C. $3x^4 + bx^3 - 1 = 0$

D. $3x^4 - bx^3 - 1 = 0$

Answer: D

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30. The value of 'k' for which roots of the equation $4x^2 - 2x + k = 0$ are complctely in (-1,1) may be equal to

A. -1

B. 0

C. 2

D. -3

Answer: A::B

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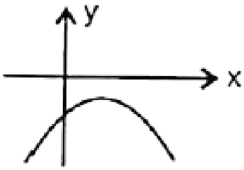
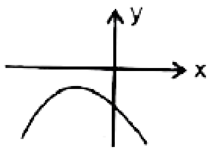
31. If a,b,c $\in R$, then for which of the following graphs of the quadratic polynomial $y = ax^2 - 2bx + c(a \neq 0)$, the product (abc) is negative ?

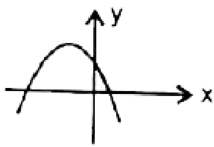
A.



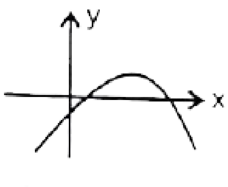
B.



C.



D.



Answer: A::C::D

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32. If the equation $ax^2 + bx + c = 0, a, b, c, \in$ R have non -real roots, then

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

B. $(a+b+c)(a-2b+4c) > 0$

C. $(a-b+c)(4a-2b+c) > 0$

D. $a(b^2-4ac) > 0$

Answer: A::B::D

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33. If α and β are the roots of the equation $ax^2 + bx + c = 0, a, b, c \in R, \alpha \neq 0$ then which is (are) correct:

A. $\alpha^2 + \beta^2 = \dfrac{b^2 - 2ac}{c^2}$

B. $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2} = \dfrac{b^2 - 2ac}{c^2}$

C. $\dfrac{1}{\alpha^3} + \dfrac{1}{\beta^3} = \dfrac{abc - b^3}{c^3}$

D. $\alpha\beta(\alpha+\beta)=\dfrac{-bc}{\alpha^2}$

Answer: A::B::D

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34. The equation $\cos^2 x-\sin x+\lambda=0, x\in(0,\pi/2)$ has roots then value(s) of λ can be equal to :

A. 0

B. $1/2$

C. -1

D. $1/2$

Answer: A::C

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35. If the equation ln $(x^2 + 5x) - \ln(x + a + 3) = 0$ has exactly one solution for x, then possible integral value of a is:

A. -3

B. -1

C. 0

D. 2

Answer: B::C::D

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36. The number of non-negative integral ordered pair(s) (x, y) for which $(xy - 7)^2 = x^2 + y^2$ holds is greater than or equal to :

A. 1

B. 2

C. 3

D. 4

Answer: A::B::C::D

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37. If $a < 0$, then the value of x satisfying $x^2 - 2a|x - a| - 3a^2 = 0$ is/are

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

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

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

D. $a(-1 + \sqrt{6})$

Answer: A::D

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38. If $0 < a < b < c$ and the roots α, β of the equation $ax^2 + bx + c = 0$ are non-real complex numbers, then

A. $|\alpha| = |\beta|$

B. $|\alpha| > 1$

C. $|\beta| < 1$

D. $|\alpha| = 1$

Answer: A::B

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39. Solve : $|x - 1| + |x - 2| + |x - 3| > 6$

A. $x \in (-\infty, 1)$

B. $x \in (-\infty, 0)$

C. $x \in (4, \infty)$

D. $(2, \infty)$

Answer: B::C

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40. The value of 'k' for which roots of the equation $4x^2 - 2x + k = 0$ are complctely in (-1,1) may be equal to

A. -1

B. 0

C. 2

D. -3

Answer: A::B

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41. Let $\alpha, \beta, \gamma, \delta$ are roots of $x^4 - 12x^3 + \lambda x^2 - 54x + 14 = 0$ If $\alpha + \beta = \gamma + \delta,$ then

A. $\lambda = 45$

B. $\lambda = -45$

C. $If \alpha^2 + \beta^2 < \gamma^2, \delta^2$ then $\frac{\alpha\beta}{\gamma \leq mda} = \frac{7}{2}$

D. If $\alpha^2 + \beta^2 < \gamma^2 + \delta^2 = \frac{\alpha\beta}{\gamma\delta} = \frac{2}{7}$

Answer: A::C

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42. If the points $\left(\frac{a^3}{(a-1)}\right), \left(\frac{(a^2-3)}{(a-1)}\right), \left(\frac{b^3}{b-1}\right), \left(\left(\frac{b^2-3}{(b-1)}\right)\right.$, and $\left(\frac{(c^2-3)}{(c-1)}\right)$, where a, b, c are different from 1, lie on the $lx + my + n = 0$, then $a + b + c = -\frac{m}{l}$ $ab + bc + ca = \frac{n}{l}$ $abc = \frac{(m+n)}{l}$ $abc - (bc + ca + ab) + 3(a + b + c) = 0$

A. $a + b + c = -\frac{m}{l}$

B. $abc = \frac{m + \pi}{l}$

C. $ab + bc + ca = \frac{n}{l}$

D. $abc - (ab + bc + ca) + 3(a + b + c) = 0$

Answer: A::C::D

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Exercise Comprehension Type Problems

1. Let $f(x) = ax^2 + bx + c, a \neq 0,$ such the $f(-1-x) = f(-1+x) \forall x \in R$. Also given that $f(x) = 0$ has no real roots and $4a + b > 0$.

Let $\alpha = 4a - 2b + c, \beta = 9a + 3b + c, \gamma = 9a - 3b + c,$ then which of the following is correct ?

A. $\beta < \alpha < \gamma$

B. $\gamma < \alpha < \beta$

C. $\alpha < \gamma < \beta$

D. $\alpha < \beta < \gamma$

Answer: C

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2. Let $f(x) = ax^2 + bx + c, a \neq 0,$ such the $f(-1-x) = f(-1+x) \forall x \in R.$ Also given that $f(x) = 0$ has no real roots and $4a + b > 0.$

Let $p = b - 4a, q = 2a + b,$ then pq is:

A. negative

B. positive

C. 0

D. nothing can be said

Answer: A

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3. If α, β the roots of equation $(k+1)x^2 - (20k+14)x + 91k + 40 = 0, (\alpha < \beta)k < 0,$ then answer the following questions.

The smaller root (α) lie in the interval :

A. $(4, 7)$

B. $(7, 10)$

C. $(10, 13)$

D. None of these

Answer: A

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4. If α, β the roots of equation $(k+1)x^2 - (20k+14)x + 91k + 40 = 0, (\alpha < \beta)k < 0,$ then answer the following questions.

The larger root (β) lie in the interval :

A. $(4, 7)$

B. $(7, 10)$

C. $(10, 13)$

D. None of these

Answer: c

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5. Let $f(x) = x^2 + bx + c \forall x \in R, (b, c, \in R)$ attains its least value at $x = -1$ and the graph of $f(x)$ cuts y-axis at $y = 2$.

The least value of $f(x) \forall x \in$ R is :

A. (a) -1

B. (b) 0

C. (c) 1

D. (d) $3/2$

Answer: C

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6. Let $f(x) = x^2 + bx + c \forall \in R, (b, c, \in R)$ attains its least value at $x = -1$ and the graph of $f(x)$ cuts y-axis at $y = 2.$

The value of $f(-2) + f(0) + f(1) =$

A. 3

B. 5

C. 7

D. 9

Answer: D

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7. Let $f(x) = x^2 + bx + c \forall \in R, (b, c, \in R)$ attains its least value at $x = \, -$ and the graph of $f(x)$ cuts y-axis at $y = 2$.

If $f(x) = a$ has two distinct real roots, then comlete set of values of a is :

A. $(1, \infty)$

B. $(-2, -1)$

C. $(0, 1)$

D. $(1, 2)$

Answer: A

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8. Consider the equation $\log_2^2 x - 4\log_2 x - m^2 - 2m - 13 = 0, m \in R$. Let the real roots of the equation be $x_1, x_2,$ such that $x_1 < x_2$.The set of all values of m for which the equation has real roots is (i) $(-\infty, 0)$ (ii) $(0, \infty)$ (iii) $[1, \infty)$ (iv) $(-\infty, \infty)$

A. $(-\infty, 0)$

B. $(0, \infty)$

C. $[1, \infty)$

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

Answer: D

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9. Consider the equation $\log_2^2 x - 4\log_2 x - m^2 - 2m - 13 = 0, m \in R$. Let the real roots of the equation be x_1, x_2 such that $x_1 < x_2$.

The sum of maximum value of, x_1 and minimum value of x_2 is :

A. $\frac{513}{8}$

B. $\frac{513}{4}$

C. $\frac{1025}{8}$

D. $\frac{257}{4}$

Answer: D

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10. The equation $x^4 - 2x^3 - 3x^2 + 4x - 1 = 0$ has four distinct real roots x_1, x_2, x_3, x_4 such that $x_1 < x_2 < x_3 < x_4$ and product of two roots is unity, then : $x_1x_2 + x_1x_3 + x_2x_4 + x_3x_4 =$

A. 0

B. 1

C. $\sqrt{5}$

D. -1

Answer: B

Watch Video Solution

11. The equation $x^4 - 2x^3 - 3x^2 + 4x - 1 = 0$ has four distinct real roots x_1, x_2, x_3, x_4 such that $x_1 < x_2 < x_3 < x_4$ and product of two roots is unity, then : $x_2^3 + x_4^3 =$

A. $\dfrac{2 + 5\sqrt{5}}{8}$

B. -4

C. $\dfrac{27\sqrt{5} + 5}{4}$

D. 18

Answer: D

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12. Let f(x) polynomial of degree 5 with leading coefficient unity such that f(1)=5, f(2)=4,f(3)=3,f(4)=2,f(5)=1, then f(6) is equal to (a).0 (b). 24 (c). 120 (d). 720

A. 120

B. -120

C. 0

D. 6

Answer: A

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13. Let $f(x)$ be a polynomial of degree 5 with leading coefficient unity, such that $f(1) = 5$, $f(2) = 4$, $f(3) = 3$, $f(4) = 2$ and $f(5) = 1$, then : Sum of the roots of $f(x)$ is equal to :

A. 15

B. -15

C. 21

D. can't be determine

Answer: A

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14. Let $f(x)$ be a polynomial of degree 5 with leading coefficient unity, such that $f(1) = 5$, $f(2) = 4$, $f(3) = 3$, $f(4) = 2$ and $f(5) = 1$, then : Sum of the roots of $f(x)$ is equal to :

A. 120

B. -120

C. 114

D. -114

Answer: A

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15. Consider the cubic equation in x, $x^3 - x^2 + (x - x^2)\sin\theta + (x - x^2)\cos\theta + (x - 1)\sin\theta\cos\theta = 0$

whose roots are α, β, γ.

The value of $\left(\frac{\alpha}{2}\right)^2 + \left(\frac{\beta}{2}\right)^2 + \left(\frac{\gamma}{2}\right)^2 =$

A. 1

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

C. $2\cos\theta$

D. $\frac{1}{2}(\sin\theta + \cos\theta + \sin\theta\cos\theta)$

Answer: B

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16. Consider the cubic equation in x, $x^3 - x^2 + (x - x^2)\sin\theta + (x - x^2)\cos\theta + (x - 1)\sin\theta\cos\theta = 0$

whose roots are α, β, γ.

Number of value of θ in $[0, 2\pi]$ for which at least two roots are equal, is :

A. 2

B. 3

C. 4

D. 5

Answer: D

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17. Let $P(x)$ be a quadratic polynomial with real coefficients such that for all real x the relation $2(1 + P(x)) = P(x - 1) + P(x + 1)$ holds.

If $P(0) = 8 \text{ and } P(2) = 32$ then :

The sum of all the coefficient of $P(x)$ is :

A. 20

B. 19

C. 17

D. 15

Answer: B

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Watch Video Solution

18. Let $P(x)$ be a quadratic polynomial with real coefficients such that for all real x the relation $2(1+P(x)) = P(x-1) + P(x+1)$ holds.

If $P(0) = 8$ and $P(2) = 32$ then :

If the range of $P(x)$ is $[m, \infty)$, then the value of m is :

A. -12

B. 15

C. -17

D. -5

Answer: C

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19. Let t be a ral number satifying $2t^2 - 9t^2 + 30 - \lambda = 0$ where $t = x + \frac{1}{x}$ and $\lambda \in R$.

If the above cubic has three real and sisinct solutions foe x then exhaustive set of value of λ be :

A. $3 < \lambda < 10$

B. $3 < \lambda < 30$

C. $\lambda = 10$

D. None of these

Answer: C

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20. Let t be a ral number satifying $2t^2 - 9t^2 + 30 - \lambda = 0$ where $t = x + \frac{1}{x}$ and $\lambda \in R$.

If the above cubic has three real and sisinct solutions foe x then exhaustive set of value of λ be :

A. $\lambda \in (-\infty, 3) \cup (30, \infty)$

B. $\lambda \in (-\infty, -22) \cup (10, \infty) \cup \{3\}$

C. $\lambda \in \{3, 30\}$

D. None of these

Answer: B

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21. Let t be a ral number satifying $2t^2 - 9t^2 + 30 - \lambda = 0$ where $t = x + \frac{1}{x}$ and $\lambda \in R$.

If the above cubic has three real and sisinct solutions foe x then exhaustive set of value of λ be :

A. $\lambda \in (3, 10)$

B. $\lambda \in \{3, 10\}$

C. $\lambda \in (-\infty, -22) \cup (10, \infty)$

D. None of these

Answer: A

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22. Consider a quadratic expression $f(x) = tx^2 - (2t - 1)x + (5x - 1)$

If $f(x)$ can take both positive and negative values then t must lie in the interval

A. $\left(\frac{-1}{4}, \frac{1}{4}\right)$

B. $\left(-\infty, \frac{-1}{4}\right) \cup \left(\frac{1}{4}\right)$

C. $\left(\frac{1}{4}\right) = \{0\}$

D. $(-4, 4)$

Answer: C

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23. Consider a quadratic expression $f(x) = tx^2 - (2t - 1)x + (5x - 1)$

If $f(x)$ is non-negetive $Aax \geq 0$ then t lies in the interval

A. $\left[\frac{1}{5}, \frac{1}{4}\right]$

B. $\left[\frac{1}{4}, \infty\right)$

C. $\left[\frac{1-}{4}, \frac{1}{4}\right]$

D. $\left[\frac{1}{5}, \infty\right)$

Answer: D

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Exercise Matching Type Problems

1.

(A)	The least positive integer x, for which $\frac{2x-1}{2x^3+3x^2+x}$ is positive, is equal to	(P)	$\frac{4}{3}$
(B)	If the quadratic equation $3x^2+2(a^2+1)x+(a^2-3a+2)=0$ possess roots of opposite sign then a can be equal to	(Q)	1
(C)	The roots of the equation $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=1$ can be equal to	(R)	6
(D)	If the roots of the equation $x^4-8x^3+bx^2-cx+16=0$ are all real and positive then $2(c-b)$ is equal to	(S)	16
		(T)	10

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2. Given the inequality $ax + k^2 > 0$. The compete set of values of 'a' so that

(A)	The inequality is valid for all values of x and k is	(P)	R
(B)	There exists a value of x such that the inequality is valid for any value of k is	(Q)	ϕ
(C)	There exists a value of k such that the inequality is valid for all values of x is	(R)	$\{0\}$
(D)	There exists values of x and k for which inequality is valid is	(S)	$R-\{0\}$
		(T)	$\{1\}$

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3.

(A)	The real root(s) of the equation $x^4 - 8x^2 - 9 = 0$ are	(P)	No real roots
(B)	The real root(s) of the equation $x^{2/3} + x^{1/3} - 2 = 0$ are	(Q)	-3, 3
(C)	The real root(s) of the equation $\sqrt{3x+1} + 1 = \sqrt{x}$ are	(R)	-8, 1
(D)	The real root(s) of the equation $9^x - 10(3^x) + 9 = 0$ are	(S)	0, 2

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4.

(A)	If a, b are the roots of equation $x^2 + ax + b = 0$ $(a, b \in R)$, then the number of ordered pairs (a, b) is equal to	(P)	1
(B)	If $P = \operatorname{cosec}\frac{\pi}{8} + \operatorname{cosec}\frac{2\pi}{8} + \operatorname{cosec}\frac{3\pi}{8} + \operatorname{cosec}\frac{13\pi}{8} + \operatorname{cosec}\frac{14\pi}{8} + \operatorname{cosec}\frac{15\pi}{8}$ and $Q = 8\sin\frac{\pi}{18}\sin\frac{5\pi}{18}\sin\frac{7\pi}{18}$, then $P + Q$ is equal to	(Q)	2
(C)	Let $a_1, a_2, a_3 \ldots\ldots$ be positive terms of a G.P and $a_4, 1, 2, a_{10}$ are the consecutive terms of another G.P. If $\prod_{i=2}^{12} a_i = 4^{\frac{m}{n}}$ where m and n are coprime, then $(m + n)$ equals	(R)	3
(D)	For $x, y \in R$, if $x^2 - 2xy + 2y^2 - 6y + 9 = 0$, then the value of $5x - 4y$ is equal to	(S)	15

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Exercise Subjective Type Problems

1. Let $f(x) = ax^2 + bx + c$ where a,b,c are integers. If $\sin\frac{\pi}{7}.\sin\frac{3\pi}{7} + \sin\frac{5x}{7} + \sin\frac{5\pi}{7}\sin\frac{5\pi}{7} + \sin\frac{\pi}{7} = f\left(\cos\frac{\pi}{7}\right)$, then find the value of $f(2)$:

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2. Let a, b, c, d be distinct integers such that the equation $(x-a)(x-b)(x-c)(x-d)-9=0$ has an integer root 'r', then the value of $a+b+c+d-4r$ is equal to :

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3. Consider the equation $\left(x^2+x+1\right)^2-(m-3)\left(x^2+x+1\right)+m=0--(1)$, where m is a real parameter. By putting $x^2+x+1=t--(2)$ then $t \geq \frac{3}{4}$ for real x the equation can be transferred to $f(t)=t^2-(m-3)t+m=0$. At what values of m for which the equation (1) will have real roots?

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4. The number of positive integral values of , $m \leq 16$ for which the equation given in the above questions has 4 distinct real root is:

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5. If the equation $(m^2 - 12)x^4 - 8x^2 - 4 = 0$ has no real roots, then the largest value of m is $p\sqrt{q}$ whre p, q are coprime natural numbers, then $p + q =$

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6. The least positive integral value of 'x' satisfying $(e^x - 2)\left(\sin\left(x + \frac{\pi}{4}\right)\right)(x - \log_e 2)(\sin x - \cos x) < 0$

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7. The integral values of x for which $x^2 + 17x + 7$ is perfect square of a rational number are a and b, then $|a - b| =$

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8. Let $p(x) = x^6 - x^5 - x^3 - x^2 - x$ and $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 - x^3 - x^2 - 1 = 0$ then $P(\alpha) + P(\beta) + P(\gamma) + P(\delta) =$

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9. The number of real values of 'a' for which the largest value of the functin $f(x) = x^2 + ax + 2$ in the interval $[-2, 4]$ is 6 will be :

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10. The number of all values of n, (whre n is a whole number) for which the equation $\frac{x-8}{n-10} = \frac{n}{x}$ has no solution.

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11. The number of negative intergral values of m for which the expression $x^2 + 2(m-1)x + m + 5$ is positive $\forall x > 1$ is:

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12. If the expression $ax^4+bx^3-x^2+2x+3$ has remainder $4x+3$ when divided by x^2+x-2, find the value of $a and b$.

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

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14. If x^2-3x+2 is a factor of $x^4-px^2+q=0$, then $p+q=$

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15. The expression $x^2 + 2xy + ky^2 + 2x + k = 0$ can be resolved into two linear factors, then $k \in$

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16. The curve $y = (\lambda = 1)x^2 + 2$ intersects the curve $y = \lambda x + 3$ in exactly one point, if λ equals $\{-2, 2\}$ b. $\{1\}$ c. $\{-2\}$ d. $\{2\}$

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17. Find the number of integral vaues of 'a' for which the range of function $f(x) = \dfrac{x^2 - ax + 1}{x^2 - 3x + 2}$ is $(-\infty, \infty)$,

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18. When x^{100} is divided by $x^2 - 3x + 2$, the remainder is $\left(2^{k+1} - 1\right)x - 2\left(2^k - 1\right)$, then $k =$

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19. Let $p(x) = 0$ be a polynomial equation of the least possible degree, with rational coefficients having $\sqrt[3]{7} + \sqrt[3]{49}$ as one of its roots. Then product of all the roots of $p(x) = 0$ is

a. 56 b. 63 c. 7 d. 49

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20. The range of value's of k for which the equation $2\cos^4 x - \sin^4 x + k = 0$ has atleast one solution is $[\lambda, \mu]$. Find the value of $(9\mu + \lambda)$.

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21. Let p (x) be a polynomial with real coefficient and $p(x) = x^2 + 2x + 1$. Find P (1).

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22. Find the smallest positive integral values of a for which the greater root, of the equation $x^2 - (a^2 + a + 1)x + (a^2 + 1) = 0$ lies between the roots of the equation $x^2 - a^2x - 2(a^2 - 2) = 0$

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23. If the equation $x^4 + kx^2 + k = 0$ has exactly two distinct real roots, then the smallest integral value of |k| is:

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24. Let $P(x) = x^6 - x^5 - x^3 - x^2 - x$ and $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 - x^3 - x^2 - 1 = 0,$ then $P(\alpha) + P(\beta) + P(\gamma) + P(\delta) =$

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25. The number of integral value of $a, a, \in [-5, 5]$ for which the equation: $x^2 + 2(a-1)x + a + 5 = 0$ has one root smalleer than 1 and the other root greater than 3 is :

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26. The number of non-negative integral vlaues of $n, n \leq 10$ so that a root of the equation $n^2 \sin^2 x - 2 \sin x - (2n+1) = 0$ lies in interval $\left[0, \frac{\pi}{2}\right]$ is:

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27. Let $f(x) = ax^2 + bx + c,$ where a,b,c are integers and $a > 1$. If $f(x)$ takes the value p, a prime for two distinct integer values of x, then the number of integer values of x for which $f(x)$ takes the value 2p is :

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28. If x and y are real numbers connected by the equation $9x^2 + 2xy + y^2 - 92x - 20y + 244 = 0,$ then the sum of maximum value of x and the minimum value of y is :

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29. Consider two numbers a,b, sum of which is 3 and the sum of their cubes is 7. Then sum of all possible distinct values of a is :

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30. If $y^2(y^2 - 6) + x^2 - 8x + 24 = 0$ and the minimum value of $x^2 + y^4$ is m and maximum value is M, then find the value of $M - 2m$.

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31. Consider the equation $x^3 - ax^2 + bx - c = 0$, where a,b,c are rational number, $a \neq 1$. it is given that x_1, x_2 and x_1x_2 are the real roots of the equation. Then $x_1x_2\left(\frac{a+1}{b+c}\right) =$

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32. Let α satisfy the equation $x^3 + 3x^2 + 4x + 5 = 0$ and β satisfy the equatin $x^3 - 3x^2 + 4x - 5 = 0, \alpha, \beta \in R,$ then $\alpha + \beta =$

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33. Let x,y and z are positive reals and $x^2 + xy + y^2 = 2, y^2 + yz + z^2 = 1$ and $z^2 + zx + x^2 = 3.$ If the value of $xy + zx$ can be expressed as $\sqrt{\frac{p}{q}}$ where p and q are relatively prime positive integral find the value of $p - q,$

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34. The number of ordered pairs (a, b) where a,b are integers satisfying the inequality min $\left(x^2 + (a-b)x + (1-a-b)\right) > \max\left(-x^2 + (a+b)x - (1+a+b)\right) \forall$ is :

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35. The real value of x satisfying $\sqrt[3]{20x + \sqrt[3]{20x + 13}} = 13$ can be expressed as $\frac{a}{b}$ where a and b are relatively prime positive integers. Find the value of b ?

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36. If the range of the values of a for which the roots of the equation $x^2 - 2x - a^2 + 1 = 0$ lie between the roots of the equation $x^2 - 2(a+1)x + a(a-1) = 0$ is (p,q), then find the value of $\left(q - \frac{1}{p}\right)$.

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37. Find the number of positive integers satisfying the inequality $x^2 - 10x + 16 < 0$.

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38. If $\sin\theta$ and $\cos\theta$ are the roots of the quadratic equation $ax^2 + bx + c = 0(a \neq 0)$. Then find the value of $\frac{b^2 - a^2}{ac}$.

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39. Let the inequality $\sin^2 x + a\cos x + a^2 \geq 1 + \cos x$ is satisfied $\forall x \in R$, for $a \in (-\infty, k_1] \cup [k_2, \infty)$, then $|k_1| + |k_2| =$

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40. If α, β are the roots of the equation $2x^2 - 35 + 2 = 0$, the find the value of $(2\alpha - 35)^3(2\beta - 35)^3$.

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41. The sum of all integral values of 'a' for which the equation $2x^2 - (1 + 2a)x + 1 + a = 0$ has a integral root.

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42. Let f (x) be a polynomial of degree 8 such that $F(r) = \frac{1}{r}, r = 1, 2, 3, \ldots, 8, 9,$ then $\frac{1}{F(10)} =$

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43. Let α, β are two real roots of equation $x^2 + px + q = 0, p, q, \in R, q \neq 0.$ If the quadratic equation $g(x) = 0$

has two roots $\alpha+\frac{1}{\alpha}, \beta+\frac{1}{\beta}$ such that sum of its roots is equal to product of roots, then number of integral values g can attain is :

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44. If cos A, cos B and cos C are the roots of the cubic $x^3+ax^2+bx+c=0$, where A,B,C are the angles of a triangle, then the value of $a^2-2b-2c$ is

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45. Find the value of a for which $ax^2+(a-3)x+1<0$ for at least one positive real x .

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