MATHS

BOOKS - VIKAS GUPTA MATHS (HINGLISH)

QUADRATIC EQUATIONS

Exercise Single Choice Problems

1. Sum of values of x and y satisfying $3^x - 4^y = 77, 3^{\frac{x}{2}} - 2^y = 7$ 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 values of 'a' for which the equation $x^4 - 2ax^2 + x + a^2 - a = 0$ has all its roots real

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

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. $3x^2 - 4x + 12$

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

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

Answer: A

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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 polynomials $p(x) = x^4 + 2x^3 - 8x^2 - 6x + 15$ and $q(x) = x^3 + 4x^2 - x - 10$ 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 $\alpha \& \beta$are the roots of the quadratic equation $ax^2 + bx + c = 0$, then the quadratic equation $ax^2 - bx(x - 1) + c(x - 1)^2 = 0$ has roots

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

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

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 $\dfrac{x^2 + 2x + a}{x^2 + 4x + 3a}$ 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 $ax^2 + 2cx + b = 0$, $a \neq o$, $b \neq c$, have a common too 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 $c\gamma$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. $-2 < x < 1 \text{ or } x > 4$

B. $-1 < x < 2 \text{ or } x > 4$

C. $x < -1 \text{ or } 2 < x < 4$

D. $x > -1 \text{ or } 2 < x < 4$

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 vlaue of $f(x)\,\forall x \in [-1, 3]$ is:

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

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

C. 1

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

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. $-2(p^2+q^2)$

B. $(p6(2)+q^2)$

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

D. $-pq$

Answer: C

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24. The roots of $a_1x^2+b_1x+c_1=0$are reciprocal of the roots of the equation $a_2x^2+b_2x+c_2=0$ if

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

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

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

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

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

Answer: D

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26. 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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27. If $\tan\theta_1, \tan\theta_2, \tan\theta_3, \tan\theta_4$ are the roots of the equation $x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x\cos\beta - \sin\beta = 0$ then prove that $\tan(\theta_1 + \theta_2 + \theta_3 + \theta_4) = \cot\beta$

A. $\sin\beta$

B. $\cos\beta$

C. $\tan \beta$

D. $\cot \beta$

Answer: D

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28. Show that if the roots of the equation $(a^2 + b^2)x^2 + 2x(ac + bd) + c^2 + d^2 = 0$are real, 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 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. 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 $b(\neq 0)$ 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

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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 $\beta+\cos^2\alpha, \beta+\sin^2 alha$ 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 $\frac{(\alpha+1)^2+(\beta+1)^2+(\gamma+1)^2+(\delta+1)^2}{\alpha+\beta+\gamma+\delta}=4$ 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 $|x-1|+|x-2|+|x-3| \geq 6$ is $(-\infty, a] \cup [b, \infty)$, 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 $x^2 - (a+1) + 2a = 0$ 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. $(1, \infty - \sqrt{2\pi\pi, n} \in N$

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 $x^3 + qx^2 + rx + \leq \ = 0$ 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. 0

B. 1

C. 2

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' for which $(k-1)x^2-(k+1)x+(k+1)$ is positive for all real value of x is:

A. 1

B. 2

C. 3

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:

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

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

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

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. Q. Let $f(x) = 10 - |x - 10| \quad \forall$x $\in [-9, 9]$ If M and m be the maximum and minimum value of 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:

A. 0

B. 2

C. 2

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 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 $\frac{3x^2+9x+17}{3x^2+9x+7}$ i s

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, tehn range of $\frac{3x-2}{7x+5}$ is :

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

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

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

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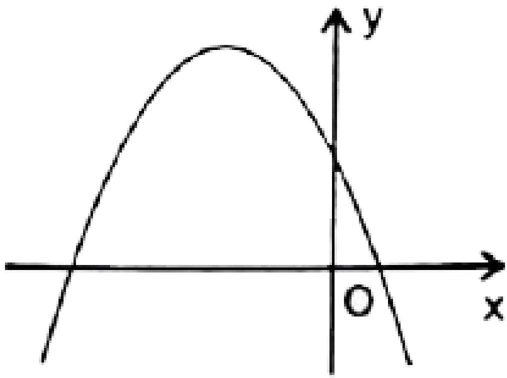
72. If graph of the quadratic $y = ax^2 + bx + c$ is given below :



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 quadratic equation $ax^2 + bx + c = 0$ does not have real roots, then which of the following may be false (a) $a(a - b + c) > 0$ (b) $c(a - b + c) > 0$ e) $b(a - b + c) > 0$ (d) $a + b + c)(a - b + c) > 0$

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

Watch Video Solution

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

A. 3

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

C. 0

D. 9

Answer: A

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

79. Let $r_1 s_1 t$ 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 $(3x^2 + kx + 3)(x^2 + kx - 1) = 0$ 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 $0 \leq x \leq 2$, 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 roots of the equation $|x^2 - x - 6| = x + 2$ are

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 $ax62 + bx + c = 0and5x^2 + 12 + 13 = 0$ 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 roots of the equation $2x^2 - 6x + k = 0$ is $\left(\frac{\alpha + 5i}{2}\right)$, then the values of a and k are

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

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

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

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

Answer: D

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

A. 19

B. 18

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

D. non-existent

Answer: B

Watch Video Solution

89. The set of values of a for which $(a-1)x^2-(a+1)x+a-1$

≥ 0 ture for all $x \geq 2$ is

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

B. $(-\infty, 1)$

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

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

Answer: D

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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

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96. 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. 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:

A. 1

B. 2

C. 3

D. infinite

Answer: B

Watch Video Solution

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

A. $m = 0$

B. $-1 < m < 1$

C. $-2 < m < 2$

D. $-4 < m < 4$

Answer: D

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99. The complete set of values of a for which the roots of the equatin $x^2 - 2|a+1|x \mid 1 = 0$ are real is given by :

A. $(0\infty, -2] \cup [0, \infty)$

B. $(-\infty, -1] \cup [0, \infty)$

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

D. $(-\infty, -2] \cup [1, \infty)$

Answer: A

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100. 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

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101. $x^2 + 4 + 3\cos(ax + b) = 2x$ has atleast on solution then the value of a+b is :

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

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

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

D. π

Answer: D

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102. 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

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

A. 2

B. 3

C. 4

D. 6

Answer: C

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104. 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

105. Graph of $f(x) = x$ & $g(x) = 2 + \ln x$, x>0 where e is base of natural log. Graph intersect at=?

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

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106. 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

107. 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

108. 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

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109. 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

110. 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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111. Let α, β are the 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 roots is equal to product of roots, then the complete range of q 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

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112. 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

113. $f(x) = x^2 + \frac{1}{x^2} - 6x - \frac{6}{x} + 2$ then min value of f(x)

A. -2

B. -8

C. -9

D. -12

Answer: C

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

A. -11

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

116. 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

117. 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

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118. 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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119. 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

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120. 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

121. 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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122. The set of values of a for which $(a-1)x^2-(a+1)x+a-1$

≥ 0 ture for all $x \geq 2$ is

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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123. 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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124. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has (A) infinite number of real roots (B) no real roots (C) exactly one real root (D) exactly four real roots

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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125. 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

Watch Video Solution

126. 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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127. If $2x^2 + 5x + 7 = 0$ 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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128. 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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129. If $a \neq 0$ and the equation $ax^2 + bx + c = 0$ has two roots α and β such that $\alpha \leq -3$ 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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130. The number of negative real roots of the equation $(x^2 + 5x)^2 - 24 = 2(x^2 + 5x)$ is :

A. 4

B. 3

C. 2

D. 1

Answer: B

Watch Video Solution

131. 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

132. 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

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133. 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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134. 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

Watch Video Solution

135. $f(x) = x^2 + \frac{1}{x^2} - 6x - \frac{6}{x} + 2$ then min value of f(x)

A. -2

B. -8

C. -9

D. -12

Answer: C

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136. 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

Watch Video Solution

137. 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

138. 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

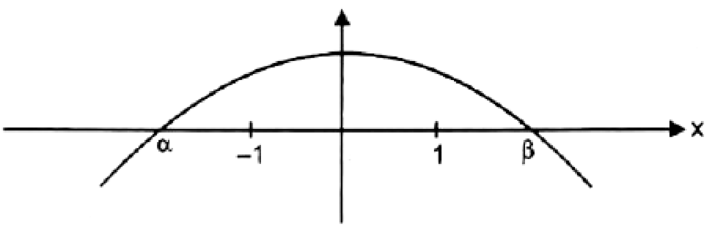
C. 0

D. -2

Answer: C

Watch Video Solution

139. 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

140. 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

141. 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

142. 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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143. IF a,b,c are real distincr numbers such that $a^3 + b^2 + c^3 = 3abc$, 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

Answer: A

Watch Video Solution

144. 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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145. 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

Watch Video Solution

146. The set of values of a for which $(a-1)x^2-(a+1)x+a-1$

≥ 0 ture for all $x \geq 2$ is

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

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

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

D. none of these

Answer: B

Watch Video Solution

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

A. 2

B. 4

C. 1

D. 3

Answer: B

Watch Video Solution

148. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has (A) infinite number of real roots (B) no real roots (C) exactly one real root (D) exactly four real roots

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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149. If α, β are the roots of the quadratic equation $x^2 - 2(1 - \sin 2\theta)x - 2\cos^2(2\theta) = 0$, 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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150. 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

151. If $a \neq 0$ and the equation $ax^2 + bx + c = 0$ has two roots α and β such that $\alpha \leq -3$ 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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152. 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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153. The solution set of the equation

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

A. $(-\infty, 2)$

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

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

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::B::D

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

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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. $b>0$

Answer: A::C

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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

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8. In the above problem, if roots of equation $f(x) = 0$ are non-real complex, then which of the following is false ?

A. $f(x) = \sin\frac{\pi x}{4}$ must have 2 solutions

B. $4a - 2b + c < 0$

C. If $\log_{f(2)} f(3)$ is not defined, then $f(x) \geq 1 \forall x \in R$

D. All a,b,c are positive

Answer: A::B::D

View Text Solution

9. 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

10. 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

11. 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

12. The possible positive integral value of 'k' for which $5x^2 - 2kx + 1 < 0$ has exactly one integral solution may be divisible by :

A. 2

B. 3

C. 5

D. 7

Answer: A::C

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13. The coefficient of x in the equation $x^2 + px + q = 0$ was wrongly written as 17 in place of 13 and the roots thus found were -2 and -15. The roots of the correct equation are (A) $15. \ -2$ (B) $-3, \ -10$ (C) $-13, 30$ (D) $4, 13$

A. -1

B. -3

C. -5

D. -10

Answer: B::D

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

A. $|x| \le 2$

B. $2 \le x \le 4$

C. $-1 \le x \le 1$

D. $2 < x \le 4$

Answer: C::D

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15. If $5^x + \left(2\sqrt{3}\right)^{2x} - 169 \leq 0$ 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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16. 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 $f(x) = 0$ or $g(x) = o$ must have real roots.

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

C. Both $f(x) = 0$ 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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17. The expression $\frac{1}{\sqrt{x + 2\sqrt{x - 1}}} + \frac{1}{\sqrt{x - 2\sqrt{x - 1}}}$ simplifies to:

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

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

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

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

Answer: B::C

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18. 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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19. Which of the following statement(s) is/are correct ?

A. The number of quadratic equations having real roots which remain unchanged even after squaring their roots is 3.

B. The number of solutions of the equation $\tan 2\theta + \tan 3\theta = 0$, in the interval $[0, \pi]$ is equal to 6.

C. For $x_1, x_2, x_3 > 0$ the minimum values of $\frac{2x_1}{x_2} + \frac{128x_3^2}{x_2^2} + \frac{x_2^2}{4x_1x_3^2}$ equals 24.

D. The locus of the mid-points of chords of the circel $x^2 + y^2 - 2x - 6y - 1 = 0$, which are passing through origin is $x^2 + y^2 - x - 3y = 0$.

Answer: A::B::D

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

A. Exactly one ral 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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21. 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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22. If a,b,c are rational numbers $(a > b > c > 0)$ and quadratic equation $(a+b-2c)x^2+(b+c-2a)x+(c+a-2b)=0$ has a root in the interval $(-1, 0)$ then which of the following statement (s) is/are correct ?

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

Watch Video Solution

23. 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

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24. 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 $\frac{4a + 2b + x}{a + 3b + 9c}$ is/are:

A. 2

B. -1

C. 3

D. $\sqrt{2}$

Answer: A::C::D

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25. 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

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26. If $0 < a < b < c$ and the roots α, β of the equation $ax^2 + bx + c = 0$ are imaginary, then

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

B. $|\alpha| > 1$

C. $|\alpha| < 1$

D. $|\alpha| = 1$

Answer: A::B

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

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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28. 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. $3a < 2 + 4b$

Answer: A::B

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

A. 1

B. 2

C. 3

D. 4

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

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

A. -1

B. 0

C. 2

D. -3

Answer: A::B

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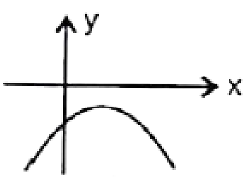
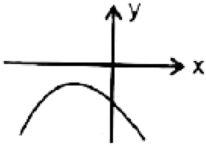
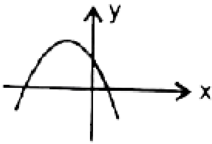
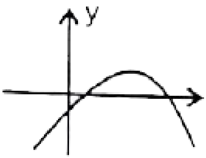
33. If a,b,c $\in R$, then for which of the following graphs of the quadratic polynomial $y = ax^2 - 2bx + c(a \neq 0)$, the product (abc) is negative ?

A. 

B. 

C. 

D. 

Answer: A::C::D

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

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

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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35. 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. $\alpha^2+\beta^2=\frac{b^2-2ac}{c^2}$

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

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

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

Answer: A::B::D

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36. 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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37. 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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38. The number of non-negative integral ordered pair (s) (x, y) for which $(xy - 7)^2 = x^2 + y^2$ holds is greater then or equal to :

A. 1

B. 2

C. 3

D. 4

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

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39. 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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40. If $0 < a < b < c$ and the roots α, β of the equation $ax^2 + bx + c = 0$ are imaginary, then

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

B. $|\alpha| > 1$

C. $|\beta| < 1$

D. $|\alpha| = 1$

Answer: A::B

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

A. -1

B. 0

C. 2

D. -3

Answer: A::B

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

A. $\lambda = 45$

B. $\lambda = -45$

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

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

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

The least valur of $f9x) \forall x \in$ R is :

A. -1

B. 0

C. 1

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 $x = -$ 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 $x = -1$ 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 $\log_2^2 x - x - 4\log_2 x - m^2 - 2m - 13 = 0, m \varepsilon R$. 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

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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. $\frac{27\sqrt{5}+5}{4}$

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. 120

B. -120

C. 0

D. 6

Answer: A

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13. IF THE MINIMUM VALUE OF AN OBJECTIVE FUNCTION Z=ax+by occurs at two point(3,4) and 4,3

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 : Product 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

Watch Video Solution

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 $P(0) = 8$ and $P(2) = 32$, then Sum of all the coefficients of $P(x)$ is:

A. 20

B. 19

C. 17

D. 15

Answer: B

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18. Let $P(x)$ be quadratic polynomical with real coefficient such tht for all real $x(1)$ 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 $'m'$ is less then

A. -12

B. 15

C. -17

D. -5

Answer: C

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19. Let t be a real number satifying $2t^3 - 9t^2 + 30 - \lambda = 0$ where $t = x + \dfrac{1}{x}$ and $\lambda \in R$. If the above cubic has three real and distinct solutions for 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 real number satifying $2t^3 - 9t^2 + 30 - \lambda = 0$ where $t = x + \frac{1}{x}$ and $\lambda \in R$.

if the cubic has exactly two real and distinct solutions for x then exhaustive set of values 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 $2t^3 - 9t^2 + 30 - \lambda = 0$ where $t = x + \frac{1}{x}$ and $\lambda \in R.$

If the cubic has four real and distinct solutions for x then exhustive set of values 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

(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)	$-8, 1$

1.

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Exercise Subjective Type Problems

1. Let $f(x) = ax^2 + bx + c$ where a, b, c are integers. If $\sin\frac{\pi}{7} \cdot \sin\frac{3\pi}{7} + \sin\frac{3\pi}{7} \cdot \sin\frac{5\pi}{7} + \sin\frac{5\pi}{7} \cdot \sin\frac{\pi}{7} = f\left(\cos\frac{\pi}{7}\right)$. 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 $\left(x^2+x+1\right)^2-(m-3)\left(x^2+x+1\right)+m=0$, where m is a real parameter. The number of positive integeral values of m for which equation has two distinct real roots, is:

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4. The number of positive integral values of $m, m \leq 16$ for which the equation $\left(x^2+x+1\right)^2-(m-3)\left(x^2+x+1\right)+m=0$, has 4 distinct real root is:

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5. If the equatio $(m^2-12)x^4-8x^2-4=0$ 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 $x^2+17x+71$ 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 $\dfrac{x-8}{n-10} = \dfrac{n}{x}$ 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 the roots of the equation, $x^2 - 8kx + 16(k^2 - k + 1) = 0$ are real, distinct and have values 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 the values of p and q are

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

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

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

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22. Find the smallest positive integral value of a for which the greater root of the equation $x^2-(a^2+a+1)x+a(a^2+1)=0$ 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 $a > 1$. Iff (x) $takesthevaluep, a'f$ or $twodist \in ct \int e \geq rvaluesofx, thenthevmberof \int$ 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 $ax^2+bx+c=0(ax\neq 0)$. 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. α and β are roots of the equation $2x^2-35x+2=0$. Find the value of $\sqrt{(2\alpha-35)^3(2\beta-35)^2}$

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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 anglesof a triangle then find the value of $a^2 - 2b - 2c$.

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45. Find the number of positive integral values of k for which $kx^2 + (k - 3)x + 1 < 0$ for atleast one positive x.

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