MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

QUADRATIC EQUATION

Question Bank

1. Solve the equation $4x^2 + 9 = 0$ by factorisation mathod .

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2. Solve the equation $x^2 - 4x + 13 = 0$ by factorisation method .

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3. Solve the equation $9x^2 - 12x + 20 = 0$ by factorisation mehod.

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4. Solve the quadratic equation $2x^2 - 4x + 3 = 0$ by using the general expression for the roots of a quadratic equation .

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5. Solve the equation $25x^2 - 30x + 11 = 0$ by using the general expression for the roots of a quadratic equation .

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6. Solve $x^2 - \sqrt{2}ix + 12$ by factrisation method .

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7. Solve $3x^2 + 7ix + 6 = 0$ by factorisation method.

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8. Solve :$x^2 - (3\sqrt{2} - 2i)x - 6\sqrt{2}i = 0$

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9. Find the square roots : i

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10. Find the square root of -5-12i

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11. Solve $x^2 - 7ix - 12 = 0$

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12. Solve $x^2 - (5+i)x + (18-i) = 0$

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13. Find the square root of (3+4i)

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14. Solve :$ix^2 - 4x - 4i = 0$

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15. If exactly one root of $5x^2 + (a+1)x + a = 0$ lies in the inteval (1,3),prove that $-12 < a < -3$.

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16. Solve : $x^2 + \left(\frac{ax}{x+a}\right)^2 = 3a^2, x \neq -a$

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17. Solve : $x^2 + \left(\sqrt{3} - 2\sqrt{2}i\right)x - 2\sqrt{6}i = 0$

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18. Solve $2x^2 - (3+7i)x - (3-9i) = 0.$

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19. Solve $\frac{x^2 - 2x - 3}{x+1} = 0.$

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20. Solve $2x^2 + x + 1 = 0$

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21. Solve $x^2 + x + \frac{1}{\sqrt{2}} = 0$

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22. Form the quadratic equation,one of whose root is 2+$\sqrt{3}$

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23. For what value of m will the equation $x^2 - (1 + 3m)x + (3 + 2m) = 0$ have equal roots ?

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24. If α and $B\eta$ are roots of $ax^2+bx+c=0$,find the value of $(a\alpha+b)^{-3}+(aB\eta+b)^{-3}$

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25. Prove that both the roots of the equation $(x-a)(x-b)+(x-b)(x-c)+(x-a)(x-c)=0$ are real.

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26. Prove that the roots of $ax^2+2bx+c=0$

will be real and distinct if and only if the roots of (a+c) $\left(ax^2+2bx+c\right)$ =2$\left(ac-b^2\right)\left(x^2+1\right)$ are imaginary

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27. Find all roots of equation $x^4 + 2x^3 - 16x^2 - 22x + 7 = 0$ if one root is $2 + \sqrt{3}$

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28. Solve for x:$4^x + 9^x = 2(6^x)$

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29. Solve for x: $\log_a x + \log_x a = 2$

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30. Solve $x^{-2} + 2x^{-1} - 3 = 0$

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31. Let $f(x) = Ax^2 + Bx + c, where A, B, C$ are real numbers. Prove that if $f(x)$ is an integer whenever x is an integer, then the numbers $2A, A + B, and C$ are all integer. Conversely, prove that if the number $2A, A + B, and C$ are all integers, then $f(x)$ is an integer whenever x is integer.

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32. If f(x) is a quadratic expression such that f(x) $> 0 \forall x \in R$, if g(x) is defined as g(x)=f(x)+f'(x)+f''(x), then prove g(x) $> 0 \forall x \in R$.

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33. If $(c > 0)$ and $2ax^2 + 3bx + 5c$=0 does not have any real roots, then prove that $2a - 3b + 5c > 0$.

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34. If $2x^3 + ax^2 + bx + 4 = 0$ (a and b are positive real numbers) has 3 real roots, then prove that $a + b \geq 6\left(2^{\frac{1}{3}} + 4^{\frac{1}{3}}\right)$.

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35. If $P(x) = ax^2 + bx + c$, and $Q(x) = -ax^2 + dx + c$, $ac \neq$ 0, then prove that P(x).Q(x) =0 has at least two real roots.

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36. If $\alpha, \beta, gaama$ are the roots of the cubic $x^3 + qx + r = 0$, find the equation whose roots are

$(\alpha - \beta)^2, (\beta - \gamma)^2, (\gamma - \alpha)^2$.

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37. f(x)=$x^2 - (m-3)x + m$=0 is a quadratic equation, find values of m for which both roots are positive

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38. f(x)=$x^2-(m-3)x+m$=0 is a quadratic equation, find values of m for which

both roots are negative

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39. $f(x)=x^2-(m-3)x+m$=0 is a quadratic equation, find values of m for which

roots are opposite in sign

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40. $f(x)=x^2-(m-3)x+m$=0 is a quadratic equation, find values of m for which one root is smaller than 2, other root is greater than 2

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41. $f(x) = x^2 - (m-3)x + m$=0 is a quadratic equation, find values of m for which

exactly one root lies in the interval [2,3]

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42. $f(x) = x^2 - (m-3)x + m = 0$ is a quadratic equation, find values of m for which

both roots lie in the interval [2,3]

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43. If,α be the root of equation $ax^2 + bx + c = 0$ and β be root of $-ax^2 + bx + c = 0$ then prove that there will be a root of the equation

$ax^2 + 2bx + 2c = 0$ lying between α and β, where a and c are non zero.

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44. Find the values of 'm' for which the equation $x^4 - (m-3)x^2 + m$=0

has

Four real roots

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45. Find the values of 'm' for which the equation $x^4 - (m-3)x^2 + m$=0

has

Four real roots

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46. Find the values of 'm' for which the equation $x^4 - (m-3)x^2 + m$=0

has

No real roots

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47. For what value of 'm' $\in R$, both roots of the equation $x^2 - 6mx + 9m^2 - 2m + 2$=0 exceed 3?

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48. Find the value(s) of 'a' for which the inequality $\tan^2 x$+ $(a+1)\tan x - (a-3) < 0$, is true for at least one $x \in \left(0, \frac{\pi}{2}\right)$.

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49. Find the common root of $x^2 - 3x + 2$=0 and $x^2 + x - 2$=0

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50. Find the condition if equations $ax^2 + bx + c=0$ and $x^2 + 2x + 3=0$ have a common root. $(a, b, c \in R)$

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51. If $x^2 + ax + bc=0$ and $x^2 + bx + ac=0$ have a common root, show their other root satisfies the equation $x^2 + cx + ab=0$

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52. If α, β are the roots $x^2 + px + q=0$ and γ, δ are the roots of $x^2 + rx + s=0$, evaluate $(\alpha - \gamma)(\alpha - \delta)(\beta - \gamma)(\beta - \delta)$ in terms of p,q,r and s. Deduce the condition that the equation may have a common root.

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53. Find condition if $ax^3 + bx^2 + cx + d$=0, has exactly one real root, $(a, b, c, d \in R)$

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54. Let P(x) $\equiv \frac{(x-a)(x-b)}{(c-a)(c-b)} . c^2 + \frac{(x-b)(x-c)}{(a-b)(a-c)} . a^2 + \frac{(x-c)(x-a)}{(b-c)(b-a)} . b^2$

Prove that P(x) has the properly that P(y) =y^2 for all y $\in$ R.

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55. Solve the equation $(x^2 - 6x)^2 = 81 + 2(x-3)^2$

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56. Show f(x)=$x^3 + px + q$=0 has a repeated root if $4p^3 + 27q^2$=0

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57. Show $x^5 - 2x^2 + 7$=0 has atleast two imaginary roots.

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58. Solution set of x satisfying $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{|x-1|}$ is

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59. Solve the equation

$|x - |4 - x|| - 2x = 4$

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60. If α, β roots of $ax^2 + bx + c$=0. Find the quadratic equation whose roots are :

$2\alpha, 2\beta$

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61. If α, β roots of $ax^2 + bx + c$=0. Find the quadratic equation whose roots are :

$\alpha + 3, \beta + 3$

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62. If α, β roots of $ax^2 + bx + c$=0. Find the quadratic equation whose roots are :

$\frac{\alpha}{4}, \frac{\beta}{4}$

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63. If α, β roots of $ax^2 + bx + c$=0. Find the quadratic equation whose roots are :

$\frac{1}{\alpha}, \frac{1}{\beta}$

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64. Find two negative integers whose difference is 3 and sum of their squares is 89.

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65. If α and β are roots of ax^2+bx+c=0 then prove that $\left(\frac{\alpha}{\beta}+\frac{\beta}{\alpha}\right)$=$\left(\frac{b^2-2ac}{ac}\right)$

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66. If $(p^2+2)x^2+2p^2x+(P^2-4)$=0 has root of opposite sign,then find the range of 'p'.

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67. Find the condition such that the quadratic equations ax^2+bx+c=0 and $\frac{x^2}{a}+\frac{x}{b}+\frac{1}{c}$=0 have exactly one root in common.

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68. If (x-1) is the factors fo polynomial x^3-px+q, then prove that p-q=1

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69. Two roots of the equation,$x^3+qx^2+11x-p$=0 are 2 and 3, find (p-q)

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70. Find the values of K for which the inequality (x-3k)(x-k-3) $<$ 0 is satisfied for all x such that 1 $\leq$ x $\leq$ 3.

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71. Let α and β be the roots of the equation $ax^2 + 2bx + c$=0 and $\alpha + \gamma$ and $\beta + \gamma$ be the roots of $Ax^2 + 2Bx + C$=0. Then prove that $A^2(b^2 - ac) = a^2(B^2 - AC)$.

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72. If $\sin\theta, \cos\theta$ are the roots of the equation $ax^2 + bx + c$=0 then find the value of $\dfrac{(a+c)^2}{b^2+c^2}$

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73. If the roots α and β of the quadratic equation $ax^2 + bx + c$=0 are real and of opposite sign.then show that roots of the equation $\alpha(x-\beta)^2 + \beta(x-\alpha)^2$=0 are also real and of opposite sign.

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74. If $x^2 - px + 4 > 0$ for all real 'x' then find 'p'

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75. For x $\in$ R, Prove that the given expression $\frac{x^2 + 34x - 71}{x^2 + 2x - 7}$ can not lie between 5 and 9.

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76. If a,b,c $\in$ R : a $\neq$ 0 and the quadratic equation $ax^2 + bx + c$=0 has no real root, then show that (a+b+c)c $>$ 0

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77. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are such that one root in greater than 3, and the other is smaller than 3

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

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79. Find the value of a which the equation $4x^2 - 2x + a$=0 has two roots lying in the interval (-1,1)

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80. Find the set of all x for which :

$$\frac{2x}{2x^2 + 5x + 2} > \frac{1}{x + 1}$$

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81. Solve the following inequalities :

$$\frac{x-1}{x^2-4x+3}<1$$

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82. Solve the following inequalities :

$$\frac{x^2-2x-1}{x+1}<x$$

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83. Solve the following inequalities :

$$\frac{x-1}{x}-\frac{x+1}{x-1}<2$$

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84. Solve the equation $\left(x^2-6x\right)^2=81+2(x-3)^2$

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85. Solve $\log_{\frac{1}{3}}\left(x^2 - 3x + 5\right) < -1$

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86. If α, β, γ are the roots of $x^3 + ax + b$=0, then the value of $\alpha^3 + \beta^3 + \gamma^3$

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87. Find the number of redered pairs (x,y) satisfying $x^2 + 1 = y$ and $y^2 + 1 = x$

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88. The roots of the quadratic equation $2x^2 + 3x + 1$=0 are

A. Irrational

B. Rational

C. Imaginary

D. none of these

Answer: B

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89. The number of values of 'a' for which

$\left(a^2 - 3a + 2\right)x^2 + \left(a^2 - 5a + 6\right)x + a^2 - 4$=0 is an identity is

A. 0

B. 2

C. 1

D. 3

Answer: C

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90. If a and b are integers and $2-\sqrt{3}$ is a root of the equation $3x^2+ax+b$=0, then value of b is

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91. If the sum of the roots of ax^2+bx+c=0 is equal to the sum of their squares, then

A. a^2 + b^2=c^2

B. a^2 + b^2 = a+b

C. 2ac= ab+b^2

D. 2c+b=0

Answer: D

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92. If x is real number, then the minimum value of $x^2 + x + 1$ is

A. 44289

B. 1

C. 3

D. None of these

Answer: A

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

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

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

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

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

Answer: C

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94. If the quadratic equations $ax^2+2cx+b$=0 and $ax^2+2bx+c$=0 (b $\neq$ 0) have a common root, then a+4b+4c is equal to

A. -2

B. -1

C. 0

D. 1

Answer: C

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95. The value of 'a' for which the equation x^3+ax+1=0 and x^4+ax^2+1=0, we have a common root is

A. a=2

B. a=-2

C. a=0

D. None of these

Answer: B

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96. The coefficient of 'x' in the quadratic equation $ax^2 + bx + c = 0$ was wrongly taken as 17 in place of 13 and its roots were found to be -2 and -15, the actual roots of the equation are

A. -2 and 15

B. -3 and -10

C. -4 and -9

D. -5 and -6

Answer: B

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97. If p and q are the roots of the equation $x^2 + px + q$=0, then

A. p=1,q=-2

B. p=0,q=1

C. p=-2,q=0

D. p=-2,q=1

Answer: A

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

A. 4

B. 12

C. 3

D. 49/4

Answer: D

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99. If α, β be the roots of $x^2 - a(x-1) + b$=0,then the value of $\dfrac{1}{\alpha^2 - a\alpha} + \dfrac{1}{\beta^2 - a\beta} + \dfrac{2}{a+b}$ is

A. 4/a+b

B. 1/a+b

C. 0

D. -1

Answer: C

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100. If one root of the equation $x^2 + (1 - 3i)x - 2(1 + i) = 0$is -1+i, then the other root is

A. -1-i

B. (-1-i)

C. i

D. 2i

Answer: D

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101. If α, β roots of $ax^2 + bx + c$=0. Find the quadratic equation whose roots are :

$\frac{\alpha}{2}, \frac{\beta}{2}$

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

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

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

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

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

Answer: A

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103. The harmonic mean of the roots of the equation *[Math Processing Error]* is`

A. 2

B. 4

C. 6

D. 8

Answer: B

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104. The equation $x^3 + 5x^2 + px + q$=0 and $x^3 + 7x^2 + px + r$=0 have two roots in common. If their third roots be $\gamma_1$and γ_2 respectively, then the ordered pair(γ_1, γ_2) is

A. (5,7)

B. (-5,-7)

C. (-5,7)

D. (5,-7)

Answer: B

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105. If the roots of $x^2 + bx + c$=0 are both real and greater than unity, then (b+c+1)

A. may be less than zero

B. may be equal to zero

C. must be greater than zero

D. must be less than zero

Answer: C

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106. Value of p, so that 6 lies between roots of the equation $x^2 + 2(p - 3)x + 9$=0

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

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

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

D. none of these

Answer: B

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107. If $x^2 - (a-3)x + a$=0 has at least one positive root,then

A. $a \in (-\infty, 0) \cup [7, 9]$

B. $a \in (-\infty, 0) \cup [7, 9)$

C. $a \in (-\infty, 0) \cup [9, \infty]$

D. none of these

Answer: C

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108. If the roots of the equation $x^2 - 2ax + a^2 + a - 3$=0 are less than 3 then

A. $a < 2$

B. $2 \leq a \leq 3$

C. $3 < a \leq 4$

D. $a > 4$

Answer: A

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109. The number of solutions of

$\log_2(x - 1) = 2\log_2(x - 3)$ is

A. 2

B. 1

C. 6

D. 7

Answer: B

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110. If x=$\left(\sqrt{13}+2\sqrt{3}\right)$, then x+1/x is equal to ?

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111. The sum of all real roots of the equation$|x-2|^2+|x-2|-2$=0 is

A. 7

B. 4

C. 1

D. 5

Answer: B

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112. If α is a root of $4x^2+2x-1$=0, then the other root is

A. $4\alpha^3-3\alpha$

B. $3\alpha^3-4\alpha$

C. $3\alpha^3+4\alpha$

D. $4\alpha^3+3\alpha$

Answer: B

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

A. $\log(2+\sqrt{5})$

B. $-\log(2+\sqrt{5})$

C. $\log(-2+\sqrt{5})$

D. none of these

Answer: D

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114. If $a < b < c < d$, then the roots of equation $(x-a)(x-c)+2(x-b)(x-d)=0$, are

A. Non-real complex

B. Real and distinct

C. Real and equal

D. Data insufficient

Answer: B

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

A. $0 < \alpha < \beta$

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

C. $\alpha < \beta < 0$

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

Answer: B

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116. If tan of angles A,B,C are the solutions of the equations $\tan^3 x + 3k \tan^2 x - 3 \tan x + k = 0$, then the triangle ABC is

A. an isosceles triangle

B. an equilateral triangle

C. a right angled triangle

D. none of these

Answer: D

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117. The number of solutions of the equation $\sin(e^x) = 5^x + 5^{-x}$ is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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118. If p(x) be a polynomial satisfying the identity $p(x^2) + 2x^2 + 10x = 2xp(x+1) + 3$, then p(x) is given by

A. 2x+3

B. 2x-3

C. 3x+2

D. 3x-2

Answer: A

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

A. Both the root in [a,b]

B. Both root in $(-\infty, a)$

C. Both roots in (b, ∞)

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

Answer: D

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120. The value of α and β such that equation $x^2 + 2x + 2 + e^a - \sin\beta$=0 having real roots.

A. $\alpha, \beta \in R$

B. $\alpha \in (0, 1), \beta \in \left(\frac{\pi}{2}, 2\pi\right)$

C. $\alpha \in (0, \infty)$and$\beta \in \left(\frac{\pi}{2}, \pi\right)$

D. none of these

Answer: D

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121. The values of 'a' for which

$x^2 + ax + \sin^{-1}\left(x^2 - 4x + 5\right) + \cos^{-1}\left(x^2 - 4x + 5\right)$=0, has at least one solution, is

A. $\left(-\infty, -\sqrt{2}\pi\right) \cup \left(\sqrt{2}\pi, \infty\right)$

B. $-2+\pi$

C. $\left(-\infty, -\sqrt{2}\pi\right] \cup \left[\sqrt{2}\pi, \infty\right)$

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

Answer: D

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122. The number of real solution to the equation $-x^2+x-1=\sin^2 x$

A. 0

B. 2

C. 3

D. 4

Answer: A

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123. If 1,2,3 and 4 are the roots of the equation $x^4 + ax^3 + bx^2 + cx + d$ =0 then a+2b+c=

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124. The smallest positive x satisfying $\log_{\sin x} \cos x + \log_{\cos x}(\sin x) = 2$, when $x \in \left(0, \frac{\pi}{2}\right)$, is

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

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

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

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

Answer: A

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125. The set of values of 'a' for which $x^2 - ax + \sin^{-1}(\sin 4) > 0 \forall x \in R$ is

A. R

B. (-2,2)

C. ϕ

D. none of these

Answer: C

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126. If $\frac{a^3(x-b)(x-c)(x-d)}{(a-b)(a-c)(a-d)} + \frac{b^3(x-c)(x-d)(x-a)}{(b-c)(b-d)(b-a)} + \frac{c^3(x-d)(x-a)(}{(c-d)(c-a)(c}$

=x^3`,then the equation having

A. no solution

B. one real and two imaginary roots

C. three real roots

D. infinitely many roots

Answer: D

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

A. a) 2 real roots

B. b) 1 real root

C. c) 3 real root

D. d) none of these

Answer: C

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128. Integral value of x for, which $(5x-1)<(x+1)^2<7x-3$

A. {1,2,3,4}

B. {3}

C. {2}

D. {4}

Answer: B

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129. If exp$\left\{\left(\sin^2 x+\sin^4 x+\sin^6 x+\ldots\right)In2\right\}$ satisfies the quadratic equation x^2-9x+8=0 then the value of `(cosx)/(cosx+sinx)(0ltxltpi/2)

A. $\dfrac{1}{\sqrt{3}+1}$

B. $\dfrac{1-\sqrt{3}}{2}$

C. $(1+\sqrt{3})+2$

D. none of these

Answer: B

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130. The number of values of the triple (a,b,c) for which a $\cos s2x + b\sin^2 x + c$=0 is satisfied by all real x, is

A. 0

B. 2

C. 3

D. infinite

Answer: D

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131. The sum of the real roots of the equation$|x|^2 + |x| - 6$=0 is

A. 4

B. 0

C. -1

D. none of these

Answer: B

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132. If $b < 0$, then the roots x_1 and x_2 of the equation $2x^2 + 6x + b$=0, satisfy the condition $\left(\frac{x_1}{x_2}\right) + \left(\frac{x_2}{x_1}\right) < k$ where k is equal to

A. -3

B. -5

C. -6

D. -2

Answer: D

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133. If $\left(2x^2-3x+1\right)\left(2x^2+5x+1\right)=9x^2$,then equation has

A. four real roots

B. two real and two imaginary roots

C. all imaginary

D. none of the above

Answer: A

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134. Ifα, β are the roots of x^2+px+q=0 and also of $x^{2n}+p^nx^n+q^n=0$ and if $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ are root of $x^n+1+(x+1)^n$=0, then n is

A. an integer

B. an odd integer

C. an even integer

D. none of the above

Answer: C

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135. If $3^{x}.8^{\frac{x}{x+2}}$=6, then x equals.

A. $1, \ -\log_3 36$

B. $2, \ -\log_5 65$

C. $3, \ -\log_7 49$

D. none of the above

Answer: A

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136. Value (s) of 'a' for which $ax^2 + (a-3)x + 1 < 0$ for at least one positive x.

A. R

B. R^+

C. $(0, \infty)$

D. $(-\infty, 1)$

Answer: D

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137. Number of solution of $|x^2 + 4x + 3| + 2x + 5 = 0$ is/are

A. `x=-4,-1+-sqrt3

B. `x=-4,-1-sqrt3

C. `x=-4,-1+sqrt3

D. none of the above

Answer: B

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138. If roots of $x^2 - (a-3)x + a$=0 are such that both of them is greater than 2, then

A. $a \in [7, 9]$

B. $a \in [7, \infty)$

C. $a \in [9, 10)$

D. $a \in [7, 9)$

Answer: C

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139. solve the inequality $\frac{(16)^{1/x}}{(2^{x+3})} > 1$

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140. Let α, β be the roots of the equation (x-a)(x-b)=c, c $\neq$ 0. Then the roots of the equation $(x-\alpha)(x-\beta)+c$=0 are :

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141. If p and q are odd integers,then the equation $x^2+2px+2q$=0

A. has no integral root

B. has no rational root

C. has no irrational root

D. has no imaginary root

Answer: A::B

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142. If x^2+mx+1=0 and (b-c)$x^2+(c-a)x+(a-b)$=0 have both roots common,then

A. m=-2

B. m=-1

C. a,b,c are in AP

D. a,b,c are HP

Answer: A::C

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143. Solution set of x satisfying $|x-1|+|x-2|+|x-3| \geq 6$ is

A. $0 \leq x \leq 4$

B. $x \leq -2 \text{or } x \geq 4$

C. $x < 0 \text{or } x > 4$

D. none of these

Answer: C

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144. The equation $\left(\frac{x}{x+1}\right)^2 + \left(\frac{x}{x-1}\right)^2$=a(a-1) has

A. four real roots if a > 2

B. two real roots if 1 $< a < 2$

C. no real root if$a > \ -1$

D. four real roots if $a > \ -1$

Answer: A::B::D

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145. If α and β are roots of the equation $ax^2 + bx + c$=0 and, if $px^2 + qx + r$=0 has roots $\frac{1-\alpha}{\alpha}$and $\frac{1-\beta}{\beta}$, then r is equal is

A. a+2b

B. a+b+c

C. ab+bc+ca

D. abc

Answer: B

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146. If $ax^2 - bx + c$=0 has two distinct roots lying in the interval (0,1),a,b,c $\in$ N. Then

A. $\log_5 abc = 1$

B. $\log_6 abc = 2$

C. $\log_5 abc = 3$

D. $\log_6 abc = 4$

Answer: B::C::D

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147. If ax^2+bx+c=0 and cx^2+bx+a=0 $(a, b, c \in R)$ have a common non-real roots,then

A. $|b| > |a|$

B. $|b| > |c|$

C. a=+-c

D. a=c

Answer: A::B::D

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148. LetP(x)=0 be the polynomial equation of least possible degree with rational coefficients having $3\sqrt{7}+3\sqrt{49}$ as a root. Then the product of all the roots of P(x)=0 is

A. 56

B. 42

C. 343

D. 7

Answer: A

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149. If 2a+3b+6c=0$(a, b, c \in R)$, then the quadratic equation $ax^2 + bx + c$=0 has

A. at least one root in [0,1]

B. at least one root in (-1,1]

C. at least one root in [0,2]

D. none of the above

Answer: A::B::C

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150. If $(\alpha, \beta) \in$ R are two of an quadratic equations,then the equation will be given as $x^2 - (\alpha + \beta)x + \alpha\beta$=0

If for a quadratic equation,the roots α, β satisfy $\alpha^2 + \beta^2$=5, $3(\alpha^5 + \beta^5) = 11(\alpha^3 + \beta^3)$,then the equations will be

A. $x^2 \pm 3x + 2$=0

B. $x^2 - 3x \pm 2$=0

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

D. $\pm x^2 + 3x + 2$=0

Answer: A

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151. If a,b $\in$ R are two of an quadratic equations,then the equation will be given as $x^2 - (\alpha + \beta)x + \alpha\beta$=0

If $\alpha\beta$=-10/3 (α, β related as above) then

A. $D > 0$

B. $D < 0$

C. D=0

D. none of the above

Answer: D

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152. Letf(x)=$x^2 + b_1x + c_1$,g(x)=$x^2 + b_2x + c_2$. Real roots fo f(x)=0 be α, β and real roots ofg(x)=0 be $\alpha + \delta$, $\beta + \delta$.Least value of f(x) be -1/4. Least value of g(x) occurs at x=7/2

The least value of g(x) is

A. -1

B. -1/2

C. -1/4

D. -1/3

Answer: C

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153. Letf(x)=$x^2 + b_1x + c_1$,g(x)=$x^2 + b_2x + c_2$. Real roots fo f(x)=0 be α, β and real roots ofg(x)=0 be $\alpha + \delta, \beta + \delta$.Least value of f(x) be -1/4. Least value of g(x) occurs at x=7/2

The least value of g(x) is

A. 6

B. -7

C. 8

D. 0

Answer: B

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154. match list i with list ii

List - I	List - II
(1) If the equation $x^2 + 2(k + 1)x + (9k - 5) = 0$ has only negative roots, then	(P) $2 < k < 4$
(2) If the inequality $x^2 - 2(4k - 1)x + 15k^2 - 2k - 7 > 0$ is valid for all x, then	(Q) $k \geq 6$
(3) If $x^2 - 2(k - 1)x + (2k + 1) = 0$ has both roots positive, then	(R) $k < -1$ or $k > 0$
(4) If $2x^2 - 2(2k + 1)x + k(k + 1) = 0$ have one root less than k and other roots greater than k, then	(S) $k \geq 4$

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155. match the equation on left with the properties on right

List - I	List - II
(1) $a < b < c < d$ and equation is $(x-a)(x-c) + \pi(x-b)(x-d) = 0$	(P) real roots
(2) $a > 0$, $a + b + c < 0$ and equation is $ax^2 + bx + c = 0$	(Q) distinct real roots
(3) $b, c, \in, I$ and the equation $x^2 + bx + c = 0$ has rational roots	(R) integral roots
(4) $a, b, c, d \in R$ are in G.P. and equation is $(a^2 + b^2 + c^2)x^2 + 2(ab + bc + ca)x + b^2 + c^2 + d^2 = 0$	(S) discriminant ≥ 0

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156. If the quadratic polynomial, $y = (\cot\alpha)x^2 + 2(\sqrt{\alpha})x + \frac{1}{2}\tan\alpha, \alpha \in [0, , 2\pi]$,can take negative values for all ξnR,then the value of $\alpha \in \left(\left(5\frac{\pi}{\lambda}\right), \pi\right)$,then the value of λ is

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157. If α, β be the roots $x^2 + px - q = 0$ and γ, δ be the roots of $x^2 + px + r = 0, p + r\phi 0$,then $\dfrac{(\alpha - \gamma)(\alpha - \delta)}{(\beta - \gamma)(\beta - \delta)}$ is equal to

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158. 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 values at least 4, is

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159. Let (x,y,z) be points with Integer coordinates satisfying the system of homogeneous equations 3x-y-z=0,-3x+2y+z=0,-3x+z=0.Then the number of such points for which $x^2 + y^2 + z^2 \leq 100$is

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160. If roots of the equation $x^2 - 10cx - 11d$=0 are a,b and those of $x^2 - 10ax - 11b$=0 are c,d,then the sum of the digits of a+b+c+d must be equal to (a,b,c and d are distinct numbers)

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161. If α, β, γ are such that $\alpha + \beta + \gamma$=4, $\alpha^2 + \beta^2 + \gamma^2$=6, $\alpha^3 + \beta^3 + \gamma^3$ =8, then the value of $\left[\alpha^4 + \beta^4 + \gamma^4\right]$ must be equal to (where[.] denotes the greatest integer function)

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162. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are

real and distinct

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163. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are equal

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164. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are not real

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165. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are opposite in sign

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166. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are equal in magnitude but opposite in sign

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167. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are positive

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168. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a - 1)x + a + 5 = 0$ are negative

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169. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are

such that one root in greater than 3, and the other is smaller than 3

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170. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are

greater than 3

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171. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are

smaller than 3

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172. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are such that exactly one root lies in the interval (1,3)

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173. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are such that both the root lies in the interval (1,3)

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174. Find the values of the parameter a for which the roots of the quadratic equation $x^2 + 2(a-1)x + a + 5 = 0$ are such that one root is greater than 3 and the other root is smaller than 1

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175. Show that the equation

$$\frac{A^2}{x-a}+\frac{B^2}{x-b}+\frac{C^2}{x-c}+\dots+\frac{H^2}{x-h}=k$$ has no imaginary root,

where A,B,C....H and a,b,c....,and $K \in R$.

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176. Solve the equation $\left(x^2-6x\right)^2=81+2(x-3)^2$

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177. $\left|x^2-3x-4\right|=9-\left|x^2-1\right|$

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178. Find the values of 'a' which $4^t-(a-4)2^t+\frac{9}{4}a<0,\ \forall t\in(1,2)$

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179. Find values of a for which the quadratic equation $3x^2 + 2(a^2 + 1)x + (a^2 - 3a + 2) = 0$ possesses roots of opposite sign.

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180. For what real 'p' do the roots of $x^2 - 2x - p^2 + 1 = 0$ lie between the roots of $x^2 - (p + 1)x + (p - 1) = 0$?

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181. If $ax^2 - bx + c$=0 has two distinct roots lying in the interval (0,1),a,b,c $\in$ N. Then

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182. Find the values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation, $(1-\tan\theta)(1+\tan\theta)\sec^2\theta$+$2^{\tan^2\theta}$=0

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183. Find the value of λ for which the inequality $3-|x-\lambda|>x^2$ is satisfied by atleast one negative $x \in R$.

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184. The equation x-2/(x-1)=1-2/(x-1) has

A. no root

B. one root

C. two equal roots

D. infinitely many roots

Answer: A

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

A. 2/9(p-q)(2q-p)

B. 2/9(q-p)(2p-q)

C. 2/9(q-2p)(2q-p)

D. 2/9(2p-q)(2q-p)

Answer: D

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

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187. α, β are the roots of the equation $(a-2)x^2-(5-a)x-5=0$

.Find 'a' if $|\alpha-\beta|=2\sqrt{6}$

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188. If f(x) = $g(x)^3+xh(x)^3$ is divisible by x^2+x+1, then

A. Both g(x) and h(x) are divisible by (x-1)

B. g(x) is divisible by (x-1) but not h(x)

C. h(x) is divisible by (x-1) but not g(x)

D. None of these

Answer: A

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189. If the roots of the equation

$a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal,then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: C

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190. If the roots of the equation $6x^3 - 11x^2 + 6x - 1$=0 are in H.P., then the roots are

A. 1,1/2,1/3

B. 1/2,1/3,1/4

C. 1/3,1/4,1/5

D. 1/4,1/5,1/6

Answer: A

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191. A value of b for which the equations $x^2 + bx - 1$=0, x^2+x+b =0` have one root in common is

A. -$\sqrt{2}$

B. -$i\sqrt{3}$

C. $i\sqrt{5}$

D. $\sqrt{2}$

Answer: B

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192. If a,b,c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root if d/a,e/b,f/c are in

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: A

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193. In what interval 'm' must lie so that the root of the equation $x^2 - 2mx + m^2 - 1 = 0$ lie between -2 and 4 ?

A. (0,1)

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

C. (-1,3)

D. [-1,3]

Answer: C

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194. The necessary and sufficient condition for the equation $(1-a^2)x^2+2ax-1=0$ to have roots lying in the interval (0,1) is

A. $a=\phi$

B. $a>0$

C. $a<0 \text{ or } a>2$

D. none of these

Answer: C

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195. For all 'x', $x^2+2ax+(10-3a)>0$, then the interval .In which 'a' lies is

A. $a<-5$

B. $-5<a<2$

C. $a > -5$

D. $2 < a < 5$

Answer: B

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196. The maximum value of $2 - 3x - 4x^2$

A. 2

B. 41/16

C. 44340

D. 9/64

Answer: B

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197. Number of solution of equation $\sin^{-1}x + \cos^{-1}(x^2) = \frac{\pi}{2}$

A. No value

B. greater than or equal to 1

C. less than or equal to 1

D. equal to 2

Answer: D

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198. The equation $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ has

A. no solution

B. one solution

C. two solution

D. more than two solutions

Answer: A

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199. Solve $x^{\left[\frac{3}{4}(\log_2 x)^2 + \log_2 x - \frac{5}{4}\right]} = \sqrt{2}$

A. at least one real solution

B. exactly three real solutions

C. exaxtly one irrational solution

D. All the above

Answer: D

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200. x.[x],{x} are in G.P. then x equals

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

B. $\frac{\sqrt{5}+1}{2}$

C. $\frac{\sqrt{5}\pm 1}{2}$

D. none of these

Answer: B

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201. The roots of the equation $x^{\sqrt{x}} = \sqrt{x^x}$ are

A. 0 and 4

B. 0 and 1

C. 0,1 and 4

D. 1 and 4

Answer: D

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202. The number of real solution of the equation $e^x = x$ is

A. 1

B. 2

C. 0

D. infinite

Answer: C

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203. Let f(x) $= x^2 + bx + c$, where b,c $\in$ R. If f(x) is a factor of both $x^4 + 6x^2 + 25$ and $3x^4 + 4x^2 + 28x + 5$, then the least value of f(x) is

A. 2

B. 3

C. 44232

D. 4

Answer: D

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204. Find the remainder when the polynomial is divided by (x-1)(x-2), if it leaves the remainder 2 when divided by (x-1) and 1 when divided by (x-2)

A. 3-x

B. x-3

C. 0

D. None of these

Answer: A

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205. If f(x)=$x-[x], x(\phi 0) \in R$, where [x] is greatest integer less than or equal to x, then the number of solution of f(x)+f(1/x)=1 are

A. 0

B. 1

C. infinite

D. 2

Answer: C

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206. The inequation

$3^{72}\left(\frac{1}{3}\right)^{x}\left(\frac{1}{3}\right)^{\sqrt{x}} > 1$ for all x belongs to

A. [0,64)

B. (0,64]

C. $(81, \infty)$

D. none of these

Answer: A

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207. If f(x) =$x^2+2bx+2c^2$, $g(x)=-x^2-2cx+b^2$, such that min $f(x)gyt\ \max\ g(x)$,then

A. no real b and c

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

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

D. $|c|<2|b|$

Answer: C

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208. Let $f(x)=ax^2+bx+c, b, c \in R, a\phi 0$, satisfying f(1)+f(2)

A. no real roots

B. 1 and 2 as real roots

C. two equal roots

D. two distinct real roots

Answer: D

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209. The value of α, for which the equation $x^2 - (\sin\alpha - 2)x - (1 + \sin\alpha) = 0$ has root whose sum of square is least, is

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

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

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

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

Answer: C

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

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

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

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

D. both (1) and (3)

Answer: A

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211. Solution set of x satisfying $x^2-|x+2|+x>0$ is

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

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

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

D. $(\sqrt{2}, \infty)$

Answer: B

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212. Let a,b,c be the sides fo a triangle where $a \neq b \neq c$ and $\lambda \in R$,if roots of the equation $x^2 + 2(a+b+c)x + 3\lambda(ab+bc+ca) = 0$ are real, then

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

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

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

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

Answer: A

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213. Let α, β, γ be the roots of f(x)=0, where $f(x) = x^3 + x^2 - 5x - 1.$

Then $[\alpha] + [\beta] + [\gamma]$ is, where [.] is greatest integer function

A. 1

B. -2

C. 4

D. -3

Answer: D

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214. The entire graphs of the equation $y = x^2 + kx - x + 9$ is strictly above the x-axis if and only if

A. $k < 7$

B. $-5 < k < 7$

C. $k > -5$

D. None of these

Answer: B

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215. The largest interval for which $x^{12} - x^9 + x^4 - x + 1 > 0$ is

A. $-4 < x \leq 0$

B. $0 < x < 1$

C. $-100 < x < 100$

D. $-\infty < x < \infty$

Answer: D

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216. The quadratic equations $x^2 - 6x + a = 0$ and $x^2 - cx + 6 = 0$ have one root in common. Other two roots of the equations are integers and they are in the ration 4:3. Then the common root is

A. 1

B. 2

C. 3

D. 4

Answer: B

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217. If α and β are the roots of the equation $ax^2 + bx + c = 0, a \neq 0, a, b, c \in R$ then $(1 + \alpha + \alpha^2)(1 + \beta + \beta^2)$=

A. 0

B. positive

C. negative

D. None of these

Answer: D

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218. Roots of the quadratic equation $(x^2 - 4x + 3) + \lambda(x^2 - 6x + 8) = 0, \lambda \in R$ will be

A. always real

B. real only when λ is positive

C. real only when λ is negative

D. always imaginary

Answer: A

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219. The number of real solution of the equation $|x|^2 - 4|x| + 3 = 0$ is

A. 4

B. 2

C. 1

D. 3

Answer: A

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220. For what values of $K \in R$ the expression $2x^2 + Kxy + 3y^2 - 5y - 2$ can be expressed as $(a_1x + b_1y + c_1).(a_2x + b_2y + c_2)$

A. -3,-4

B. 2,3

C. 3,4

D. 7,-7

Answer: D

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221. How many real solutions does the equation

$x^7 + 14x^5 + 16x^3 + 30x - 560 = 0$ have ?

A. 1

B. 3

C. 5

D. 7

Answer: A

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222. Set of value of $k(k \in R)$ for which equation $x^2 - 4|x| + 3 - |k-1| = 0$ will have exactly four roots is

A. (-2,4)

B. (-4,4)

C. (-4,2)

D. (-1,0)

Answer: A

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223. It is given that equation $4x^3 - 3x - p = 0$ has a unique root in the interval [1/2.1], where$-1 \leq p \leq 1$. The value of this root is

A. 44257

B. $\sin\left(\frac{1}{3}\sin^{-1}p\right)$

C. $\cos\left(\frac{1}{3}\cos^{-1}p\right)$

D. none of these

Answer: C

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224. If $3^{x+2} - 9^{-1/x} > 0$, then the interval of x can be

A. $x \in (0, \infty)$

B. $x \in (0, 250)$

C. $x \in R$

D. $x \in (-250, 250)$

Answer: A::B

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225. The roots of the equation

$\left(a+\sqrt{b}\right)^{x^2-15}$+$\left(a-\sqrt{b}\right)^{x^2-15}$=2a where $\left(a^2-b\right)=1$ are

A. +-3

B. ± 4

C. $\pm\sqrt{14}$ and ± 4

D. $\pm\sqrt{5}$

Answer: B::C

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226. For what real value of 'a' do the roots of $x^2-2x-\left(a^2-1\right)=0$ lie between the-root $x^2-2(a+1)x+a(a-1)=0$

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227. The real solutions of the equation

$$\sqrt[4]{97-x}+\sqrt[4]{x}=5$$

A. 9,81

B. 16,18

C. 16,81

D. 61,81

Answer: C

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228. Consider the equation

$$x^2+x-a=0, a \in N$$

If equation has integral roots,then

A. a=2

B. a=6

C. a=12

D. a=20

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

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229. A function $f: R \to R$ where R is the set of real numbers,is defined by

$$f(x) = \frac{\alpha x^2 + 6x - 8}{\alpha + 6x - 8x^2}$$

value of α for which f is onto.

A. (2,14)

B. [2,4]

C. (-2,2)

D. [-4,4]

Answer: A::B

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230. If $b^2 \geq 4ac$ for the equations $ax^4 + bx^2 + c = 0$ then all the roots of the equation will be real if

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

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

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

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

Answer: B::D

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231. The real roots of the equation

$$\sqrt{x+2\sqrt{x+2\sqrt{x+\ldots+2\sqrt{x+2\sqrt{3x}}}}} = x$$

A. 0,3

B. 1,3

C. 1,2

D. none of these

Answer: A

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232. $\log_{x^2+6x+8}\log_{2x^2+2x+3}(x^2-2x)=0$ holds for

A. x={1}

B. $x \in (0, 1)$

C. x={-1,-3}

D. x={-1}

Answer: D

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233. The values of 'a' for which the equation $4^x - a2^x - a + 3 = 0$ has at least one solution.

A. $a \in [2, \infty)$

B. $a \in (-\infty, -6]$

C. $a \in R$

D. none of these

Answer: A

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234. Let the roots of f(x)=xbe α and β where f(x) is quadratic polynomial $ax^2 + bx + c$. α and β are also the roots of f(f(x))=x. Let the other two roots of f(f(x))=x be γ and λ

Statement I : if α and β are real unequal then γ and λ are also real.

Statement II : if α and β are imaginary then γ and λ are also imaginary.

The correct statement are

A. I only`

B. II only

C. both I and II

D. neither I nor II

Answer: B

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235. Let the roots of f(x)=xbe α and β where f(x) is quadratic polynomial ax^2+bx+c. α and β are also the roots of f(f(x))=x. Let the other two roots of f(f(x))=x be γ and λ

Statement I : if α and β are real unequal then γ and λ are also real.

Statement II : if α and β are imaginary then γ and λ are also imaginary.

The correct statement are

A. I and II

B. III and IV

C. II and III

D. I and IV

Answer: B

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236. Let x_1, x_2, x_3, x_4,be the roots (real or complex) of the equation $x^4 + ax^3 + bx^2 + cx + d = 0.$

If $x_1 + x_2 = x_3 + x_4$ and a,b,c,d $\in$ R, then

If a=2, then the value of b-c is

A. -1

B. 1

C. -2

D. 2

Answer: B

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237. Let x_1, x_2, x_3, x_4,be the roots (real or complex) of the equation $x^4 + ax^3 + bx^2 + cx + d = 0.$

If $x_1 + x_2 = x_3 + x_4$ and a,b,c,d $\in$ R, then

If $b < 0$, then how many different values of 'a' we many have

A. 3

B. 4

C. 1

D. 0

Answer: C

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238.

Match List - I with List - II

List - I	List - II
(1) α, β are the roots of $x^2 - 3x + a = 0$, $a \in R$ and $\alpha < 1 < \beta$, then a can be	(P) -1
(2) The equation $cx^2 + 2bx - 3a = 0$ has non-real roots and $\frac{3a}{4} < (b+c)$, then a can be	(Q) 2
(3) If $\sin^2 x + \sin x - a = 0$, $\forall x \in R$, then a can be	(R) 1
(4) If $\frac{ax^2+3x+4}{x^2+2x+2} < 5$, $\forall x \in R$, then a can be	(S) $\frac{5}{2}$

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2. Match List - I with List - II

List - I	List - II
(1) Number of rational roots of $2x^3 - 3x^2 - 11x + 6 = 0$, are	(P) 3
(2) Number of integral root of $5x^3 - 11x^2 + 12x - 2 = 0$	(Q) 0
(3) If rational roots of $16x^4 - 64x^3 + 56x^2 + 16x - 15 = 0$ are in AP, the common difference is	(R) 1
(4) If rational roots of $2x^3 - 21x^2 + 63x - 54 = 0$ are in GP then common ratio is	(S) 2

239.

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240. Number of solutions for $x^2 - 2 - 2[x] = 0$, (where[.] denotes greatest integer function is

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241. The even root of the equation greater than 2 of $(x-2)^6+(x-4)^6=64$ is

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242. If α and β are the distinct roots of the equation $x^2-p(x+1)-b=0$, then E=$\frac{\alpha^2+2\alpha+1}{\alpha^2+2\alpha+b}$+(beta^2+2beta+1)/(beta^2+2beta+b)`= ____

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243. The number of non-zero solutions of the equation, $x^2-5x-(sgn)6=0$ is

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244. If the equation $x^2 + 2(k+1)x + 9k - 5$=0 has only negative roots, then the value of k is

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245. If $P(x) = ax^2 + bx + c$, and $Q(x) = -ax^2 + dx + c, ac \neq$ 0, then prove that P(x).Q(x) =0 has at least two real roots.

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246. If,α be the root of equation $ax^2 + bx + c = 0$ and β be root of $-ax^2 + bx + c = 0$ then prove that there will be a root of the equation $ax^2 + 2bx + 2c = 0$ lying between α and β, where a and c are non zero.

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247. Let x,y,z be real variable satisfying the equations x+y+z=6 and xy+yz+zx=7. Then find the range in which the variable can lie.

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248. If one root of the quadratic equation $ax^2 + bx + c = 0$ is equal to the n^th power of the other root then show that, $(ac^n)^{\frac{1}{n+1}} + (a^n c)^{\frac{1}{n+1}} + b$=0

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249. Find all real values of a for which the equation

$x^4 + (a-1)x^3 + x^2 + (a-1)x + 1 = 0$

possesses at least two distinct positive roots.

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250. Solve the equation (x+2)(x+3)(x+8)(x+12)=$4x^2$

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251. Solve the equation $x^{\log_x (x+3)^2}$=16

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252. If x is real, find the values of k for which $\frac{|x^2+kx+1|}{|x^2+x+1|} < 3$

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

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

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

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

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

Answer: A::D

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254. Let α and β be the roots of the equation $x^2 - 6x - 2 = 0$. If $a_n = \alpha^n - \beta^n$, for $n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{2a_9}$ is equal to

A. -6

B. 3

C. -3

D. 6

Answer: B

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255. If α, β are the roots of $x^2 - px + 1 = 0$ and γ is a root of $x^2 + px + 1 = 0$, then $(\alpha + \gamma)(\beta + \gamma)$ is

A. 0

B. 1

C. -1

D. p

Answer: A

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256. The quadratic expression $(2x + 1)^2 - px + q \neq 0$ for any real x if

A. $p^2 - 16p - 8q < 0$

B. $p^2 - 8p - 16q < 0$

C. $p^2 - 8p - 16q < 0$

D. $p^2 - 16p - 8q < 0$

Answer: C

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257. Given that x is a real number satisfying $\frac{5x^2 - 26x + 5}{3x^2 - 10x + 3} < 0$, then

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

B. $\frac{1}{5} < x < 3$

C. $x > 5$

D. $\frac{1}{5} < x < \frac{1}{3}$ or $3 < x < 5$

Answer: D

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258. Let f : R to R be defined as f(x) = $\frac{x^2 - x + 4}{x^2 + x + 4}$. Then the range of the function f(x) is

A. [3/5,5/3]

B. (3/5,-5/3)

C. $\left(-\infty, \frac{3}{5}\right) \cup \left(\frac{5}{3}, \infty\right)$

D. [-5/3,-3/5]

Answer: A

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259. If 2 + i and $\sqrt{5} - 2i$ are the roots of the equation $\left(x^2 + ax + b\right)\left(x^2 + cx + d\right) = 0$, where a,b,c,d are real constants, then product of all roots of the equation is

A. 40

B. $9\sqrt{5}$

C. 45

D. 35

Answer: C

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260. Which of the following is/are always false ?

A. A quadratic equation with rational coefficients has zero or two irrational roots

B. A quadratic equation with rational coefficients has zero or two non-real roots

C. A quadratic equation with rational coefficients has zero or two rational roots

D. A quadratic equation with rational coefficients has zero or two irrational roots

Answer: C

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261. The quadratic equations p(x) =0 with real coefficients has purely imaginary roots. Then the equation p(p(x))=0 has

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

A. (-2,-1)

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

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

D. (1,2)

Answer: C

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

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

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

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

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

Answer: B

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264. In a Δ ABC, $\tan A$ and $\tan B$ are roots of pq$\left(x^2 + 1\right) = r^2 x$. Then Δ ABC is

A. a right angled triangle

B. an acute angled triangle

C. an obtuse angled triangle

D. an equilateral triangle

Answer: A

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265. If α, β are the roots of the quadratic equation $x^2 + px + q = 0$, then the values of $\alpha^3 + \beta^3$ and $\alpha^4 + \alpha^2\beta^2 + \beta^4$ are respectively

A. $3pq - p^3$ and $p^4 - 3p^2q + 3q^2$

B. $-p(3q - p^2)$ and $(p^2 - q)(p^2 + 3q)$

C. pq-4 and $p^4 - q^4$

D. $3pq - p^3$ and $(p^2 - q)(p^2 - 3q)$

Answer: D

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266. Let p,q be real numbers. If α is the root of $x^2 + 3p^2x + 5q^2 = 0$, β is a root of $x^2 + 9p^2x + 15q^2 = 0$ and $0 < \alpha < \beta$, then the equation $x^2 + 6p^2x + 10q^2 = 0$ has a root γ that always satisfies.

A. $\gamma = \frac{\alpha}{4} + \beta$

B. $\beta < \gamma$

C. $\gamma = \frac{\alpha}{2} + \beta$

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

Answer: D

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267. Let α, β be the roots of $x^2 - x - 1 = 0$ and $S_n = \alpha^n + \beta^n$, for all integers $n \geq 1$. Then for every integer $n \geq 2$,

A. S_n+S_(n+1)=S_(n+1)`

B. S_n-S_(n-1)=S_(n+1)`

C. $S_{n-1} = S_{n+1}$

D. S_n+S_(n-1)=2S_(n+1)`

Answer: A

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268. If α, β are the roots fo $ax^2 + bx + c = 0(a \neq 0)$ and $\alpha + h, \beta + h$ are the roots of $px^2 + qx + r = 0(p \neq 0)$ then the ration of the squares of their discriminants is

A. $a^2 : p^2$

B. $a : p^2$

C. $a^2 : p$

D. a:2p

Answer: A

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269. The equation $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ has

A. 2

B. 0

C. 3

D. 1

Answer: B

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270. If a, b and c are positive numbers in a G.P., then the roots of the quadratic equation $(\log_e a)x^2 - (2\log_e b)x. + (\log_e c) = 0$ are

A. $-1 \text{ and } \dfrac{\log_e c}{\log_e a}$

B. $1 \text{ and } -\dfrac{\log_e c}{\log_e a}$

C. $1 \text{ and } \log_a c$

D. $-1 \text{ and } \log_c a$

Answer: C

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271. If the equation $x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0, a, b, c \in R$, have a common root, then a:b:c is

A. 3:2:1

B. 1:3:2

C. 1:2:3

D. 3:1:2

Answer: C

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272. If α and β are the roots of $x^2 - x + 1 = 0$,then the value of $\alpha^{2013} + \beta^{2013}$ is equal to

A. 2

B. -2

C. -1

D. 1

Answer: B

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273. If α, β are the roots of the quadratic equation $x^2 + ax + b = 0$, $(b \neq 0)$, then the quadratic equation whose roots are $\alpha - \frac{1}{\beta}, \beta - \frac{1}{\alpha}$ is

A. $ax^2 + a(b-1)x + (a-1)^2 = 0$

B. $bx^2 + a(b-1)x + (b-1)^2 = 0$

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

D. $abx^2 + bx + a = 0$

Answer: B

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274. Let p(x) be a quadratic polynomial with constant term 1. Suppose p(x) when divided by x-1 leaves remainder 2 and when divided by x+1 leaves remainder 4. Then the sum of the roots of p(x)=0 is

A. -1

B. 1

C. 1/2

D. 4

Answer: D

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275. If α, β are the roots of the quadratic equation $ax^2 + bx + c = 0$ and $3b^2 = 16ac$ then

A. $\alpha = 4\beta \text{or} \beta = 4\alpha$

B. $\alpha = -4\beta \text{or} \beta = -4\alpha$

C. $\alpha = -3\beta \text{or} \beta = -3\alpha$

D. $\alpha = -3\beta \text{or} \beta = -3\alpha$

Answer: C

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276. Let $\sin\alpha, \cos\alpha$, be the roots of the equation $x^2 - bx + c = 0$. Then which of the following statements is/are correct ?

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

B. $b \leq \sqrt{2}$

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

D. $b > \sqrt{2}$

Answer: A::B

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277. What is the calorific value of 80 gms of carbohydrate, 15 gms of protein and 10.4 gms of fat in a breakfast? What is physiological fuel value of food?

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278. 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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279. The equations $x^2 + x + a = 0$ and $x^2 + ax + 1 = 0$ have a common real root

A. for no value of a

B. for exactly one value of a

C. for exactly two value of a

D. for exactly three value of a

Answer: B

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280. If $(\alpha + \sqrt{\beta})$ and $(\alpha - \sqrt{\beta})$ are the roots of the equation $x^2 + px + q = 0$ where α, β,p and q are real, then the roots of the equation $(p^2 - 4q)(p^2x^2 + 4px) - 16q = 0$ are

A. $\left(\frac{1}{\alpha} + \frac{1}{\sqrt{\beta}}\right)$ and $\left(\frac{1}{\alpha} - \frac{1}{\sqrt{\beta}}\right)$

B. $\left(\frac{1}{\sqrt{\alpha}} + \frac{1}{\beta}\right)$ and $\left(\frac{1}{\sqrt{\alpha}} - \frac{1}{\beta}\right)$

C. $\left(\frac{1}{\sqrt{\alpha}} + \frac{1}{\sqrt{\beta}}\right)$ and $\left(\frac{1}{\sqrt{\alpha}} - \frac{1}{\sqrt{\beta}}\right)$

D. $(\sqrt{\alpha} + \sqrt{\beta})$ and $(\sqrt{\alpha} - \sqrt{\beta})$

Answer: A

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281. If a, b, c are in arithmetic progression, then the roots of the equation $ax^2 - 2bx + c = 0$ are

A. 1 and c/a

B. -1/a and -c

C. -1 and -c/a

D. -2 and -c/2a

Answer: A

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282. The quadratic equation $2x^2 - (a^3 + 8a - 1)x + a^2 - 4a = 0$ possesses roots of opposite sign. Then

A. $a \leq 0$

B. $0 < a < 4$

C. $4 \leq a < 8$

D. $a \geq 8$

Answer: B

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283. A value of b for which the equations x^2+bx-1=0, x^2+x+b =0` have one root in common is

A. $-\sqrt{2}$

B. $-i\sqrt{3}$

C. $i\sqrt{5}$

D. $\sqrt{2}$

Answer: B

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284. Let α and β be the roots of the equation $x^2-6x-2=0$. If $a_n=\alpha^n-\beta^n$, for $n\geq 1$, then the value of $\dfrac{a_{10}-2a_8}{2a_9}$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

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285. Let α, β be real and z be a complex number. If$z^2 + \alpha z + \beta = 0$ has two distinct roots on the line Re z = 1, then it is necessary that

A. $\beta \in (-1, 0)$

B. $|\beta| = 1$

C. $\beta \in [1, \infty)$

D. $\beta \in (0, 1)$

Answer: B

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286. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, then a, b and c satisfy the relation

A. $a^2 + b^2 + 2abc = 0$

B. $a^2 - b^2 + 2ac = 0$

C. $a^2 + c^2 + 2abc = 0$

D. $a^2 - b^2 - 2abc = 0$

Answer: C

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287. Let a, b, c be three number such that a+2b+4c=0. Then the equation $ax^2 + bx + c = 0$

A. has both the roots complex

B. has its roots lying within $-1 < x < 0$

C. has one of roots equal to 1/2

D. has its roots lying within $2 < x < 6$

Answer: C

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288. If the ratio of the roots of the equation $px^2 + qx + r$ is a:b, then $a\frac{b}{(a+b)^2}$ =

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

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

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

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

Answer: B

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289. If α and β are the roots of the equation $x^2 + x + 1 = 0$, then the equation whose roots are α^{19} and β^7 is

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