MATHS

BOOKS - BHARATI BHAWAN MATHS (HINGLISH)

Equations, Inequation and Expressions

Exercise

1. For what value of a the equation $(a^2 - a - 2)x^2 + (a^2 - 4)x + (a^2 - 3a + 2) = 0$ will have more than two solutions. Does there exist a real value of x for which rthe above equation will be an identitiy in a

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2. Solve for x : $(x^2 - 6x)^2 = 81 + 2(x - 3)^2$

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3. Solve foe $x \in R \sqrt{x+8+6\sqrt{x-1}} - \sqrt{x+3+4\sqrt{x-1}} = 1.$

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4. Solve for x : $(x-1)^3 + (x-2)^3 + (x-3)^3 + (x-4)^3 + (x-5)^3 = 0.$

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5. Solve for $x : 3x^3 = \{x^2 + \sqrt{18}x + \sqrt{32}\}\{x^2 - \sqrt{18}x - \sqrt{32}\} - 4x^2.$

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6. Solve $(18)^{8-4x} = (54\sqrt{2})^{3x-2}.$

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7. Solve $2^{\sin^2 x} + 5.2^{\cos^2 x} = 7.$

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8. Solve for x: $4^{x+1.5} + 9^{x+0.5} = 10.6^{x}.$

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9. Solve for $x\left(5+2\sqrt{6}\right)^{x} \text{ ^ } (2-3) + \left(5-2\sqrt{6}\right)^{x} \text{ ^ } (2-3) = 10$

(1985,5M)

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10. Solve $\left(\sqrt{3}+1\right)^{2_x} + \left(\sqrt{3}-1\right)^{2_x} = 2^{3x}.$

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11. If $a > 1$, prove that the solutions of the following equation in x is independent of a. $\left(a+\sqrt{a^2-1}\right)^{x^2-2x}+\left(a-\sqrt{a^2-1}\right)^{x^2-2x}=2a.$

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12. Solve for $x : x + (\log)_{10}(1+2^x) = x\log_{10}5 + \log_{10}6$

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13. x के लिए, निम्न समीकरण को हल कीजिए

$\log_{(2x+3)}\left(6x^2+23x+21\right)=4-\log_{(3x+7)}\left(4x^2+12x+9\right)$

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14. Solve $25^{\log_{10}x}=5+4x^{\log_{10}5}$

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15. Solve $|x^2+4x+3|+2x+5=0.$

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

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17. Solve $(x+2)^2-3|x+2|+2=0$.

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18. Solve $|x+1|+|x-1|=2.$

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19. $\log_{|x+6|} 2. \log_2(x^2-x-2) \ge 1$

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20. The set of real values of x satisfying the equation $|x-1|^{\log_3(x^2)-2\log_x(9)}=(x-1)^7$

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21. Let {x} and [x] denote the fractional and integral part of a real number x respectively. The value (s) of x satisfying 4{x} = x + [x] is/are

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22. If x, y, z are positive intergers and $x+y+z=240$ and $x^2+y^2=z^2$ then find the number of positive solutions.

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23. Find the positive solutions of the system of equations $x^{x+y} = y^n$ and $y(x+y) = 2^{2n.Y^n, wheren > 0}$

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24. Solve the equations $\log_{1000}|x+y| = \frac{1}{2}. \log_{10} y - \log_{10}|x| = \log_{100} 4$ for x and y

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

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26. Find the set of all real 'a' such that $5a^2 - 3a - 2, a^2 + a - 2$ and $2a^2 + a - 1$ are the lenghts of the sides of a triangle?

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27. Solve $(x+3)^2-(x-1)^5 \geq 244.$

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28. Let $\sqrt{\frac{(x+1)(x-3)}{(x-2)}}$. Find all the real values of x for which y takes real values.

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29. Let $f(x)=\frac{2x}{2x^2+5x+2}$ and $g(x)=\frac{1}{x+1}$. Find the set of real values of x for which $f(x)>g(x)$.

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30. $1<\frac{3x^2-7x+8}{x^2+1}<2$

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31. Solve for $x \in R : 4^{x^2} = < 3.2^{x^2+2} + 4^{x+1}$.

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32. Solve $|x-1| + |x-2| + |x-3| \geq 6, x \in R$.

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33. Solve $||x-2|-1| \geq 3$.

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34. If $x = \frac{4}{9}$ satisfies the equation $(\log)_a(x^2 - x + 2) > (\log)_a(-x^2 + 2x + 3)$, then the sum of all possible distinct values of $[x]$ is (where$[.]$ represetns the greatest integer function) ___

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35. If $\log_{3x+5}(ax^2+8x+2) > 2$ then x lies in the interval

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36. Let there be a quotient of two natural numbers in which the derin which the denominator is one less than the square of tor If we add 2 to both numerator & denomenator, the quotient will exceed $\frac{1}{3}$& If we subtract 3 from numerator & denomenator, the quotient will lie between $0\&\frac{1}{10}$. Determine the quotient.

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37. If p and q are odd integers the equation $x^2 + 2px + 2q = 0$ cannot have (A) real roots (B) non real roots (C) rational roots (D) irrational roots

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38. If the roots of $x^2 - ax + b = 0$ are real and differ by a quantity which is less than c(c> 0),prove that b lies between $\left(\frac{1}{4}\right)(a^2 - c^2)$ and (1/4)a^2`..

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39. If $a < b < c < d$ the equation $(x - a)(x - c) + \lambda(x - b)(x - d) = 0$ has real roots for

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40. If p is the first of the n arithmetic means between two numbers and q be the first on n harmonic means between the same numbers. Then, show that q does not lie between p and $\left(\frac{n+1}{n-1}\right)^2 p$.

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41. Let $a, b \in nana > 1$. Also p is a prime number. If $ax^2 + bx + c = p$ for any intergral values of x, then prove that $a + bx + c \neq 2p$ for any integral value of $x \cdot$

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42. Given two quadratic equation $x^2 - x + m = 0$ and $x^2 - x + 3m = 0, m \neq 0$. Find the value of m for which one of the roots of the second equation is equal to double the root of the first equation.

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43. If a, b, c are in HP, find the relation between the roots of $ax^2 + bx + c = 0.$

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

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45. For what values of $m \varepsilon R,$ both roots of the equation $x^2 - 6mx + 9m^2 - 2m - 2 = 0$ exceed 3?

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46. If $ax^2 - bx + c = 0$ have two distinct roots lying in the interval $(0, 1); a, b, \ \in N,$ then the least value of a , is

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47. The set of values of a for which the inequality, $x^2 + ax + a^2 + 6a < 0$ is satisfied for all $x belongs(1, 2)$ lies in the interval:

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48. Find all integral values of a for which the quadratic expression $(x-a)(x-10)+1$ can be factored as a product $(x+\alpha)(x+\beta)$ of two factors and $\alpha, \beta \in I$.

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49. Find the values of the parameter a for which $4^x - a.2^x - a + 3 \leq 0$ for atleast one real x.

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50. Find all values of the parameter a for which the inequality $a.9^x + 4(a-1)3^x + a > 1$ is satisfied for all real values of x

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51. Solve the equation $\sqrt{a(2x^x - 2) + 1} = 1 - 2^x, x \in R$.

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52. Find the possible values of 'a' such that the inequality $3 - x^2 > |x - a|$ has atleast one negative solution

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53. The sum of all the integral value(s) of $k \in [0, 15]$ for which the inequality $1 + \log_5(x^2 + 1) \leq \log_5(kx^2 + 4x + k)$ is true for all $x \in R$, is

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54. The real numbers x_1, x_2, x_3 satisfying the equation $x^3 - x^2 + bx + \gamma = 0$ ar ein A.P. Find the intervals in which $\beta and \gamma$ lie.

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55. If $\alpha, \beta and \gamma$ are roots of $2x63 + x^3 - 7 = 0$, then find the value of $\sum \left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha}\right)$.

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56. If $f(x) = x^2 + bx^2 + cx + d and f(0), f(-1)$ are odd integers, prove that $f(x) = 0$ cannot have all integral roots.

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

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58. Show that the minimum value of $(x+a)(x+b)/(x+c)\dot{w}herea > c, b > c,$ is $\left(\sqrt{a-c} + \sqrt{-c}\right)^2$ for real values of $x \succ \cdot$

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

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60. If $\left|\frac{12x}{4x^2+9}\right| \leq 1$, then

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61. Prove that for all real values of $x and y, x^2 j + 2xy + 3y^2 - 6x - 2y \geq -11.$

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62. The value(s) of m for which the expression $2x^2 + mxy + 3y^2 - 5y - 2$ can be factorized in to two linear factors are:

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63. if α is a real root of the quadratic equation $ax^2 + bx + c = 0$ and β is a real root of $-ax^2 + bx + c = 0$ then show that there is a root γ of the equation $\frac{a}{2}x^2 + bx + c = 0$ which is lies between α and β.

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64. If $a_1x^3 + b_1x^2 + c_1x + d_1 = 0$ and $a_2x^3 + b_2x^2 + c_2x + d_2 = 0$ have a pair of repeated roots common, then prove that

$$\begin{vmatrix} 3a_1 & 2b_1 & c_1 \\ 3a_2 & 2b_2 & c_2 \\ a_2b_1 - a_1b_2 & c_1a_2 - c_2a_1 & d_1a_2 - d_2a_1 \end{vmatrix} = 0$$

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65. If 2a+3b+6c = 0, then show that the equation $ax^2 + bx + c = 0$ has atleast one real root between 0 to 1.

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66. For what values of a the following will be an identity in x ?

$$\left(x^2 - 1\right)a^2 - (2x + 3)a - \left(x^2 + 2x + 2\right) = 0$$

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67. The number of integral triplets (a, b, c) such thet $a + b\cos 2x + c\sin^2 x = 0$ for all x, is

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68. Let k be the value of a for which the equation $(a^2 + 4a + 3)x^2 + (a^2 - a - 2)x + a(a + 1) = 0$ has morethan two roots. If the expression $x^2 + (3m + 1)x + m^2 - 4 < 0 \forall x \in (k, k + 1)$, then find the number ofintegral values of m in the range of m.

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69. Solve $(x^2 + 2)^2 + 8x^2 = 6x(x^2 + 2)$

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70. Solve $(x + 4)(x + 7)(x + 8)(x + 11) + 20 = 0.$

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71. Solve $\sqrt{5x^2 - 6x + 8} + \sqrt{5x^2 - 6x - 7} = 1.$

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72. Number of real solutions of $\sqrt{x} + \sqrt{x - \sqrt{1 - x}} = 1$ is

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73. Solve $(x + 3)^4 + (x + 2)^4 + (x + 1)^4 = 98.$

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74. Solve for x : $2x^3 + 5x^2 - 2x + 3 = 0.$

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75. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in A.P. then common difference will be ± 1 b. ± 2 c.± 3 d. ± 4

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76. Obtain the real solutions for x,y. $xy + 3y^2 - x + 4y - 7 = 0$ and $2xy + y^2 - 2x - 2y + 1 = 0$

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77. Solve for x,y,z. $xy + x + y = 23xz + z + x = 41yz + y + z = 27.$

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78. If $a + b + c \neq 0,$ the system of equations $(b + c)(y + z) - ax = b - c, (c + a)(z + x) - by = c - a$ and $(a + b)(x + y) - cz = a - b$ has

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79. Solve for x,y. $x^2 + y(x+1) = 17$ and $y^2 + x(y+1) = 13$

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80. $12^{5x-2} = \left(24\sqrt{3}\right)^{3-x^2}$

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81. Solve $32^{\frac{x+5}{x-7}} = \frac{1}{4} \cdot 128^{\frac{x+17}{x-3}}$.

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82. 9. Solve for x:$5^{x+1} + 5^{1-x} = 26$

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83. Solve $9^x + 78 = 3^{2x+3}$.

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84. Solve: $16^{\sin} \hat{} (2x)16^{\cos} \hat{} (2x) = 10, 0 \leq x < 2\pi$

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85. $\left(3^{\frac{1}{5}}\right)^x + \left(3^{\frac{1}{10}}\right)^{x-10} = 84$

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86. $Solvex \in R: 2^x + (0.5)^{2x-3} - 6(0.5)^x = 1$

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87. Solve for x when : $6^{2x+4} = 3^{3x} \cdot 2^{x+8}$.

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88. Solve for $x : 4^x 3^{x-1/2} = 3^{x+1/2} - 2^{2x-1}$.

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89. Solve $7 \cdot 3^{x+1} - 5^{x+3} = 3^{x+1} - 5^{x+2}$.

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90. $solve$ for x ,$3^x.8^{\frac{x}{x+2}} = 6$

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91. Solve $\left(\sqrt{3}+\sqrt{2}\right)^x + \left(\sqrt{3}-\sqrt{2}\right)^x = 10.$

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92. Solve $\left\{\sqrt{3+2\sqrt{2}}\right\}^{x}+\left\{\sqrt{3-2\sqrt{2}}\right\}^{x}=6.$

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93. Solve $\left(2+\sqrt{3}\right)^{x^{2}-2x+1}+\left(2-\sqrt{3}\right)^{x^{2}-2x-1}=\dfrac{2}{2-\sqrt{3}}.$

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94. Solve $\left(\sqrt{2}+1\right)^{x}+\left(\sqrt{2}-1\right)^{x}=6.$

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95. Solve : $\log_{5-x}\left(x^{2}-2x+65\right)=2$

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96. Solve : $\log_{4}8+\log_{4}(x+3)-\log_{4}(x-1)=2$

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97. Solve : $\log_7 \log_5\left(\sqrt{x+5}+\sqrt{x}\right)=0$

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98. Solve $\log_3(3^x-8)=2-x$

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99. $\log_2\left(25^{x+3}-1\right)=2+\log_2\left(5^{x+3}+1\right)$

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100. Solve $\log_2(4\times 3^x-6)-\log_2(9^x-6)=1.$

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101. Solve $\log_4(2 \times 4^{x-2} - 1) + 4 = 2x$.

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102. Solve $\log_5\left(5^{\frac{1}{x}} + 125\right) = \log_5 6 + 1 + \frac{1}{2}x$.

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103. Solve $x + \log_{10}(2^x + 1) = \log_{10} 6 + x \log_{10} 5$.

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104. Solve : $1 + 2\log_{2+x} 5 = \log_5(x + 2)$

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105. Solve $\log_{1-x}(3 - x) = \log_{3-x}(1 - x)$.

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106. Solve : $\log_{1-2x}(6x^2-5x+1)-\log_{1-3x}(4x^2-4x+1)=2$

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107. Solve $6(\log_x 2-\log_4 x)+7=0.$

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108. Solve : $3\log_x(4)+2\log_{4x}4+3\log_{16x}4=0$

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109. Solve $\log_3(\log_8 x)=-1.$

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110. Solve : $7^{\log x} = 98 - x^{\log 7}$

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111. Solve $4^{\log x} = 32 - x^{\log 4}$.

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112. If $4^{\log_2 2x} = 36$, then find x.

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113. Solve $|3x - 1| = 2x, x \in R$.

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114. Solve : $|x + 4| = 3x - 2, x \in R$

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115. Solve : $|x^2 + x| - 5 = 0$ for real x

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116. $|x^2 - 2x - 8| = 2x$

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117. Solve : $|x^2 - x - 6| = x + 2, x \in R$

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118. Solve $|x^2 + x + 1| = 3, x \in R.$

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119. Solve : $2|x+1|^2 - |x+1| = 3, x \in R$

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120. Solve $2|x+1| + |x-3| = 4, x \in R.$

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121. Solve : $2|3-x|| + 3|x-1| = 4, x \in R$

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122. Solve $|2x+1| - 2|x-2| = 5, x \in R.$

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123. Solve : $|x^2 - x| + |x+1| = 5, x \in R$

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124. Solve : $\left|x^2+x+1\right|+|2x-3|=4x, x \in R$

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125. Solve $\left|2^{x+1}-1\right|+\left|2^{x+1}+1\right|=2^{|x+1|}$.

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126. Solve : $|x|^{x^2-x-2}=1.$

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127. $2^{|y|}-\left|2^{y-1}-1\right|=2^{y-1}+1$

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128. Solve $\left(x^2 - 3x - 3\right)^{|x+1|} = 1.$

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129. Solve $\dfrac{x^2 - x + 6}{x^2 + 5x - 6} \leq 0$

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130. Solve $\log_3\left(\sqrt{x} + \left|\sqrt{x} - 1\right|\right) = \log_9\left(4\sqrt{x} - 3 + 4\left|\sqrt{x} - 1\right|\right).$

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131. $|x - 2|^{\log} \_ 2x^{3 - 3\log_x 4} = (x - 2)^3$

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132. Solve in R: $x^2 + 2[x] = 3x$ where [.] denotes greatest integer function.

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133. Let [x] = the greatest integer $\leq x$, and $\{x\} = x - [x]$ (x)=2[x]-{x}, $x < 0$ [x]+3{x} $x \geq 0$ then solve the equation $(x) = x + \{x\}$.

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134. If $xy = 2(x + y), x \leq yandx, y \in N,$ then the number of solutions of the equation are a. two b. three c. no solution d. infinitely many solutions

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135. The number of non negative integral solution of $x+y+z \leq n$, where $n \in N$

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136. $6^x + 6^y = 42, x + y = 3$

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137. The no of real solutions of the equation $\left(15+\sqrt{14}\right)^t + \left(15-\sqrt{14}\right)^t$ = 30 are where t = x^2 - 2$|x|$

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138. Solve the system of equations,

$$\left|x^2-2x\right|+y=1, x^2+|y|=1.$$

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139. Solve the following equations for x and y: $\log_{10} x + \log_{10} (x)^{\frac{1}{2}} + \log_{10} (x)^{\frac{1}{4}} + \ldots. = y$ (1+3+5+...+(2y-1))/(4+7+10+..+(3y+1))=20/(7log_10x)`

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140. Let $[a]$ denotes the larger integer not exceeding the real number a if x and y satisfy the equations $y = 2[x] + 3$ and $y = 3[x - 2[$ simultaneously determine $[x + y]$

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141. Number of real solution of $|x + 1| = e^{x}$ is

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142. Solve : $2x^2 - 3x + 5 < 0$

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143. Find all real values of x which satisfy $x^2 - 3x + 2 > 0 and x^2 - 2x - 4 \leq 0.$

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144. Find all integers x for which $(5x - 1) < (x + 1)^2 < (7x - 3)$.

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145. The set of all real numbers a such that $a^2 + 2a, 2a + 3, and a^2 + 3a + 8$ are the sides of a triangle is____

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146. Solve :$(x+3)^4 + (x-1)^4 \geq 82$

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147. $Solve \frac{8x^2+16x-51}{2x^2+5x-12} > 3$

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

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149. The solution set of $\frac{10x}{x^2+9} \leq 1$ is

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150. Let $y = \sqrt{\frac{(x+1)(x+3)}{(x-2)}}$. Find all the real values of x for which y takes real values.

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151. Solve $\frac{2x+3}{x^2+x-12} < \frac{1}{2}$.

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152. The least integral value α of x such that $\frac{x-5}{x^2+5x-14} > 0$, satisfies

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153. The range of x for which $(0.\ 5)^{2-3x} < (2^x)^x (0.\ 25)^{x+4}$ is

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154. For all real values of x if $\left|\frac{x^2-3x-1}{x^2+x+1}\right| < 3$ limit of x are

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155. Solve $\left|\frac{x^2-5x+4}{x^2-4}\right| \leq 1$

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156. Solve $\frac{|x-1|}{x+2} < 1$

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157. Solve : $\frac{|x-3|}{x^2-5x+6} > 2$

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158. The solution set of the ineequation $\frac{x^2 + 6x - 7}{|x + 4|} < 0$ is

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159. Solve: $(\log)_3(2x^2 + 6x - 5) > 1$

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160. Solve $\log_{10}(x^2 - 2x - 2) \leq 0.$

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161. Solve $\log_{x-2}(3x^2 - x - 1) > 0.$

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162. Solve $\log_x\left(2x - \frac{3}{4}\right) < 2$

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163. Solve the inequality: $\log_x 2. \log_{2x} 2. \log_2 4x > 1$

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164. Solve $\log_2. \frac{x-4}{2x+5} < 1.$

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165. Solve the following inequation .

(xv) $x^{(\log_{10} x)^2 - 3\log_{10} x + 1} > 1000$

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166. The solution of $2^x + 2^{|x|} \geq 2\sqrt{2}$ is

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167. Solve $||x-2|-1| \geq 3.$

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168. Solve the following inequalities $|\log_3 x| - \log_3 x - 3 < 0$

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169. The solution of $|x|^{x^2-x-2} < 1$ is

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

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171. if the roots of the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal then show that $\frac{2}{b}=\frac{1}{a}+\frac{1}{c}$

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172. The roots of the equation $(a^2+b^2)x^2-2(bc+ad)x+(c^2+d^2)=0$ are equal if

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

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174. Show that if p, q, r and s are real numbers and $pr=2(q+s)$, then atleast one of the equations $x^2+px+q=0$ and $x^2=rx+s=0$ has

real roots.

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175. If $ax^2+(b-c)x+a-b-c=0$ has unequal real roots for all $c \in R, then$ `b<0 a >0`

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176. -If $a, b, c \in R$ then prove that the roots of the equation $\frac{1}{x-a}+\frac{1}{x-b}+\frac{1}{x-c}=0$ are always real cannot have roots if $a=b=c$

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177. If the equations $ax+by=1$ and $cx^2+dy^2=1$ have only one solution, prove that $\frac{a^2}{c}+\frac{b^2}{d}=1$ and $x=\frac{a}{c}, y=\frac{b}{d}$

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178. If a, b, c are odd integere then about that $ax^2 + bx + c = 0$, does not have rational roots

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179. Show that the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has no real solution.

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180. 14 For what values of p, the roots of the equation $12(p+2)x^2 - 12(2p-1)x - 38p - 11 = 0$ are imaginary`

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181. If the ratio of the roots of the equation $lx^2 + nx + n = 0$ is $p : q$ prove that $\sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} + \sqrt{\frac{n}{l}} = 0$

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182. If one root of equation $(l-m)x^2+lx+1=0$ be double of the other and if l be real, show that $m \le \frac{9}{8}$

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183. if the roots of the equation $\frac{1}{x+p}+\frac{1}{x+q}=\frac{1}{r}$ are equal in magnitude but opposite in sign, show that p+q = 2r & that the product of roots is equal to $\left(-\frac{1}{2}\right)(p^2+q^2)$.

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

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185. If a,b,c are in G.P. then the roots of the equation $ax^2 + bx + c = 0$ are in ratio

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186. Let $a > 0, b > 0$ then both roots of the equation $ax^2 + bx + c = 0$

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187. If α is a root of the equation $x^2 + 2x - 1 = 0,$ then prove that $4\alpha^2 - 3\alpha$ is the other root.

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188. If α, β are the roots of the equations $x^2 + px + q = 0$ then one of the roots of the equation $qx^2 - (p^2 - 2q)x + q = 0$ is (A) 0 (B) 1 (C) $\frac{\alpha}{\beta}$ (D) $\alpha\beta$

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189. Let a and b be roots of $x^2 - 3x + p = 0$ and let c and d be the roots of $x^2 - 12x + q = 0$ where a, b, c, d form an increasing G.P. Then the ratio of $(q+p):(q-p)$ is equal to

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190. If α, β are the nonzero roots of $ax^2 + bx + c = 0 and \alpha^2, \beta^2$ are the roots of $a^2x^2 + b^2x^2 + b^2x + c^2 = 0, then a, b, c$ are in a. G.P. b. H.P. c. A.P. d. none of these

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191. If α, β are the roots of the equation $ax^2 + bx + c = 0$ and $S_n = \alpha^n + \beta^n$, show that $aS_{n+1} + bS_n + cS(n+10 = 0$ and hence find S_5

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192. If α, β be the roots of the equation $\lambda^2(x^2 - x) + 2\lambda x + 3 = 0$ and λ_1, λ_2 be the two values of λ for which α and β are connected by the relation $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{4}{3}$, then find the equation whose roots are $\frac{(\lambda_1)^2}{\lambda_2}$ and $\frac{(\lambda_2)^2}{\lambda_1}$

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193. If a, b are the roots of $x^2 + px + 1 = 0$ and c, d are the roots of $x^2 + qx + 1 = 0$, Then $\frac{(a-c)(b-c)(a+d)(b+d)}{q^2 - p^2}$

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194. If c, d are the roots of the equation $(x-a)(x-b) - k = 0$, prove that a, b are roots of the equation $(x-c)(x-d) + k = 0$.

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195. If α, β are roots of $x^2 - px + q = 0$ then find the quadratic equation whose roots are $\left(\left(\alpha^2 - \beta^2\right)\left(\alpha^3 - \beta^3\right)\right)$ and $\alpha^2\beta^3 + \alpha^3\beta^2$

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196. 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) $4, 13$

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197. In copying a quadratic equation of the form $x^2 + px + q = 0$,a student wrote the coefficients of x incorrectly and the roots were found to be 3 and 10; another student wrote the same equation but he wrote the constant term incorrectly and thus, he found the roots to be 4 and 7. The roots of the correct equation are

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198. Find p in R for which $x^2 - px + p + 3 = 0$ has one positive and one negative root.

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199. Find $p \in R$ for which $x^2 - px + p + 3 = 0$ has one root>2 and the other root<2.

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200. For what values of $a \in R,$ the quadratic equation $(a^2 + 1)x - (a + l)x + (a^2 - a - 2) = 0$ will have roots of opposite sign.

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201. For what values of a, does the equation $ax^2 - (a+1)x + 3 = 0$, have roots lying between 1 and 2.

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202. Find the real values of the parameter a such that $(2a+1)x^2 - a(x-1) = 2$ has one root greater than 1 and other less than 1

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203. Find the integral values of a for which the equation $x^4 - (a^2 - 5a + 6)x^2 - (a^2 - 3a + 2) = 0$ has only real roots

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204. Find the values of k so that the quadratic equation x^2 + 2(k-1)x + k+5 = 0 has atleast one positive root.

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205. The range of real values of 'p' for which the equation $2\log_3^2 x - |\log_3 x| + p = 0$ has four distinct solutions is

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206. For what values of the parameter a the equation $x^4 + 2ax^3 + x^2 + 2ax + 1 = 0$ has atleast two distinct negative roots?

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207. For what values of the parameter a the equation $x^4 + 2ax^3 + x^2 + 2ax + 1 = 0$ has atleast two distinct negative roots?

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208. Find the integral values of a for which $(a+2)x^2+2(a+1)x+a=0$ will have both roots integers

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209. Consider the inequation $9^x-a3^x-a+3\leq 0$, where a is real parameter.

The given inequality has at least one real solutions for $a\in$.

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210. Find t values of the parameter a such that the rots α,β of the equation $2x^2+6x+a=0$ satisfy the inequality $\alpha/\beta+\beta/\alpha<2$.

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211. If the roots of $10x^3 - cx^2 - 54x - 270$ are in harmonic progression, then find c and all the roots.

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212. Find the roots $\alpha, \beta, \gamma,$ of $x^3 - 11x^2 + 36x - 36 = 0$ if $\frac{2}{\beta} = \frac{1}{\alpha} + \frac{1}{\gamma}$.

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213. If the roots of $x^3 + px^2 + qx + r = 0$ are in GP find the relation between p, q and r

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214. If $(m_r, 1/m_r), r = 1, 2, 3, 4,$ are four pairs of values of $x andy$ that satisfy the equation $x^2 + y^2 + 2gx + 2fy + c = 0$, then the value of m_1, m_2, m_3, m_4 is 0 b. 1 c. -1 d. none of these

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

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216. Solve the equation $24x^3 - 14x^2 - 63x + \alpha = 0$, one root being double of another. Hence find the vulue(s) of λ.

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217. If α, β, γ be the roots of $ax^3 + bx^2 + cx + d = 0$ then find the value of $\sum a^2$,

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218. If α, β, γ be the roots of $ax^3 + bx^2 + cx + d = 0$ then find the value of $\sum \frac{1}{\alpha}$.

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219. If α, β, γ are the roots of the equation $ax^3 + bx^2 + cx + d = 0$ then find the value of $\sum \left(\alpha^2(\beta + \gamma)\right)$

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220. If the equation $x^2 + px + q = 0$and$x^2 + p'x + q' = 0$ have a common root , prove that , it is either $\frac{pq' - p'q}{q' - q}$or,$\frac{q' - q}{p' - p}$.

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221. Find the sum of all the values of m so that , the equations $3x^2 - 2mx - 4 = 0$ and $x^2 - 4mx + 2 = 0$" may have a common root.("

Can the equations have a common nonreal root)

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222. Prove that equations $(q-r)x^2+(r-p)x+p-q=0$ and $(r-p)x^2+(p-q)x+q-r=0$ have a common root.

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223. Prove that , if the equations $x^2+bx+ca=0$ and $x^2+cx+ab=0$ have only non-zero common root then their other roots satisfy the equation $t^2+at+bc=0$.

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224. If the two equation $x^2-cx+d=0$ and $x^2-ax+b=0$ have one common root and the second has equal roots then 2(b + d) is equal to

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225. If $ax^2 + 2bx + c = 0$ and $a_1x^2 = 2b_1x + c_1 = 0$ have commonroot and $\frac{a}{a_1}, \frac{b}{b_1}, \frac{c}{c_1}$ are in A.P., show that are: $ax^2 + 2bx + c = 0$

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226. If equations $ax^2 - bx + c = 0$ (where $a, b, c \varepsilon R$ and $a \neq 0$) and $x^2 + 2x + 3 = 0$ have a common root, then show that $a : b : c = 1 : 2 : 3$

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227. If a, b, c, a_1, b_1, c_1 are rational and equations $ax^2 + 2bx + c = 0$ and $a_1x^2 + 2b_1x + c_1 = 0$ have one and only one root in common, prove that $b^2 - ac$ and $b_1^2 - a_1c_1$ must be perfect squares.

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228. 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

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229. Let λ, μ be such that the equations $4x^2 - 8x + 3 = 0, x^2 + \lambda x - 1 = 0$ and $2x^2 + x + \mu = 0$ may have a common root for each pair of equations but all 3 equations do not have a common root, then $\mu \times \lambda$ equals

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230. Find the values of a for which $x^2 - ax + 1 - 2a^2 \geq 0$ for real values of x.

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231. Find the minimum value of $3x^2 - 6x + 7, x \in R$ and also find the corresponding value of x.

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232. Find the maximum value of $(2+3x)(1-x), x \in R$ and also find the corresponding value of x.

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

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234. Range of $\frac{x^2 - x + 1}{x^2 + x + 1}$ is

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235. If for all real x $\frac{x+a}{x^2+bx+c^2}$ cannot lie between two limits, then:

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236. If x is real, show that the expression $\frac{4x^2+36x+9}{12x^2+8x+1}$ can have any real value .

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237. If $x \in R, and a, b, c$ are in ascending or descending order of magnitude, show that $(x-a)(x-c) / (x-b)(where x \neq b)$ can assume any real value.

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238. If $f(x)=\frac{ax^2+x-2}{a+x-2x^2}$ has the range R when $x \in R$ then

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239. Let $f(x) = \frac{mx^2 + 3x + 4}{x^2 + 3x + 4}, m \in R$. If $f(x) < 5$ for all $x \in R$ then the possible set of values of m is :

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240. For $x \in R$, the expression $\frac{x^2 + 2x + c}{x^2 + 4x + 3c}$ can take all real values if $c \in$

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241. $x^2 - xy + y^2 - 4x - 4y + 16 = 0$ represents a. a point b. a circle c. a pair of straight line d. none of these

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242. If the expression $x^2 + 2(a+b+c)x + 3(bc+ca+ab)$ is a perfect square then

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243. If $\left(a_1x^2 + b_x + c_1\right)y + \left(a_2x^2 + b_2x + c_1\right) = 0$ find condition that x is a rational function of y.

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244. 52 Show that $a(b-c)x^2$ +$b(c-a)xy$ + $c(a-b)y^2$ will be a perfect square if a, b, c are in H.P

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245. For what value of k, $(x+y+z)^2 + k\left(x^2+y^2+z^2\right)$ can be resolved into linear rational factors?

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246. If $(x-1)^2$ is a factor of ax^3+bx^2+c then roots of the equation $cx^3+bx+a=0$ may be

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247. If $a_1x^3+b_1x^2+c_1x+d_1=0$ and $a_2x^3+b_2x^2+c_2x+d_2=0$ have a pair of repeated roots common, then prove that

$$\begin{vmatrix} 3a_1 & 2b_1 & c_1 \\ 3a_2 & 2b_2 & c_2 \\ a_2b_1-a_1b_2 & c_1a_2-c_2a_1 & d_1a_2-d_2a_1 \end{vmatrix}=0$$

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248. If $|x|+|x-1|=3$ then x=______ .

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249. The solution-set of the equation $\log_5 \log_2\left(\sqrt{4x+2}+2\sqrt{2}\right)=0$ is

________ .

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250. Fill in the blanks If

$x<0, y<0, x+y+(x/y)=(1/2) and (x+y)(x/y)=-(1/2), thenx$

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251. The number of real solutions of the equation $\left|x^2\right|-3|x|+2=0$ is

_______ .

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252. If $x\equiv 2+^{2/3}$ then the value$\left(x^3-6x^2+6x\right) is$

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253. The AM of the roots of $x^2 - 12x + 3 = 0$ is ________ .

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254. The GM of the roots of $x^3 - 6x^2 + 11x - 6 = 0$ is _______ .

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255. The quadratic equation whose roots are twice the roots of $x^2 - 3x + 3 = 0$ is _____ .

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256. The quadratic equation whose roots are 2 more than the roots of $ax^2 + bx + c = 0$, is _____ .

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257. If α, β are roots of $ax^2 + 2bx + c = 0$ then $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} =$

________ .

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258. if $2 = I\sqrt{3}$ be a root of the equation $x^2 + px + q = 0$, where p and q are real, then find p and q

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259. The value of $\sqrt{2 + \sqrt{2 + \sqrt{2 + \ldots\ldots\infty}}}$ is ________ .

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

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261. If the roots of $4-3x+5x^2+x^3=0$ are α, β, γ then the value of $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=$ _______ .

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262. The equation $x^2+2(\gamma+1)x+a(a-4)=0$ has negative roots only if γ belongs to the interval ________ .

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263. The solution-set of $x^4-1>0, x \in R$ is _____ .

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264. If $x^2+ax+b=0$ and $x^2+bx+a=0, (a \neq b)$ have a common root, then $a+b$ is equal to

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265. The sum of a number and its reciprocal is $\frac{10}{3}$, find the number(s).

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266. Solve $3^{x-1}+3^{1-x}=2$ is

A. 1

B. 2

C. 0

D. -1

Answer:

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

A. 0

B. 1

C. 2

D. none of these.

Answer:

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268. For the equation $x^{\frac{3}{4}(\log x)^2 + \log_2 x - \frac{5}{4}} = \sqrt{2}$, which one of the following is true ?

A. only one real solution

B. exactly one irrational solution

C. exactly three real solutions

D. normal complex roots only.

Answer:

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269. The equation $x - 2/x - 1 = 1 - 2/x - 1$ has a. no root b. one root c. two equals roots d. Infinitely many roots

A. no roots

B. one root

C. two equal roots

D. infinite roots.

Answer:

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270. If l, m, n are real $l \neq m$, then the roots of the equation $(l - m)x^2 - 5(l_+ m)x - 2(l - m) = 0$ are a. real and equal b. Complex

c. real and unequal d. none of these

A. real and equal

B. nonreal complex

C. real and unequal

D. none of these.

Answer:

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

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

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

C. c

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

Answer:

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272. If $\alpha and \beta$ are the roots of $x^2 + px + q = 0 and \alpha^4, \beta^4$ are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always. one positive and one negative root two positive roots two negative roots cannot say anything

A. two real roots

B. two negative roots

C. two positive roots

D. one positive and one negative roots.

Answer:

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

A. $m = -1$

B. $m = 2$

C. $m = -2$

D. b, a, c are in AP

Answer:

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274. Solve the equation $x^4 - 4x^2 + 8x + 35 = 0$ gine that one of roots is $2 + \sqrt{-3}$

A. all roots are imaginary

B. two real and two imaginary roots

C. one root real and three imaginary

D. none of these.

Answer:

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275. 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 a, c b. b, c c. a, b d. $a+c, b+c$

A. a,c

B. b,c

C. a,b

D. a+c,b+c.

Answer:

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276. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in A.P. then common difference will be ± 1 b. ± 2 c.± 3 d. ± 4

A. ± 1

B. ± 2

C. ± 3

D. $\pm 4.$

Answer:

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277. If $P(x) = ax^2 + bx + c,\ Q(x) = -ax^2 + dx + c$ where $ac \neq 0$ then $P(x).\,Q(x) = 0$ has

A. two real roots

B. four real roots

C. atmost two real roots

D. at least two real roots.

Answer:

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278. if $b^2 \geq 4$ac for the equation $ax^4 + bx^2 + c = 0$ then 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:

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

A. $[0, \propto)$

B. $(-\propto, 0]$

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

D. none of these.

Answer:

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280. IF $a^2+b^2+c^2=1$ then the range of $ab+bc+ca$ is

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

B. $[-1, 2]$

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

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

Answer:

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281. The difference between the roots of the equation $x^2 + kx + 1 = 0$ is less than $\sqrt{5}$,then the set of possible values of k is

A. $(3, + \propto)$

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

C. $(- 3, 3)$

D. none of these.

Answer:

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282. The real value of a for which $x^2 + i(a - 1)x + 5 = 0$will have a pair of conjugate complex roots is

A. values satisfying $a^2 - 2a + 21 > 0$

B. 1

C. all values

D. no value.

Answer:

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283. If a, b, c are positive then both roots of the equation $ax^2 + bx + c = 0$

A. positive

B. negative

C. with negative real parts

D. none of these.

Answer:

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284. The expression $a^2x^2 + bx + 1$ will be positive for all $x \in R$ if

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

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

C. $4b^2 > a^2$

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

Answer:

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285. If $x, y, and z$ are real and different and $u = x^2 + 4y^2 + 9z^2 - 6yz - 3zx - 2xy, the\nu$ is always a. non-negative b. zero c. non-positive d. none of these

A. non-negative

B. non-positive

C. zero

D. none of these.

Answer:

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286. The least value of $ax^2 + bx + c, (a > 0)$ is

A. $b^2 - 4ac$

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

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

D. $\frac{4ac - b^2}{4a}$.

Answer: D

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287. If x be real, then the maximum value of $5+4x-4x^2$ will be equal to

A. 5

B. 6

C. 1

D. 2

Answer:

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288. If $x^2+px=1$ is a factor of the expression $ax^3+bx=c$, then $a^2-c^2=ab$ b. $a^2+c^2=-ab$ c. $a^2-c^2=-ab$ d. none of these

A. $a^2+c^2=-ab$

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

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

D. none of these.

Answer:

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289. If $a+b+c=0$, then, the equation $3ax^2+2bx+c=0$ has , in the interval (0,1).

A. (-1,1)

B. (0,2)

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

D. (0,1).

Answer:

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290. If the value of ax^2+bx+c is always an integer for integral values of x where a, b, c are rationals then a+b must be an integer.

A. an integer.

B. a negative integer

C. a positive integer

D. none of these

Answer: A

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

A. 1

B.

C.

D.

Answer:

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292. Fill in the blank : If f(x) = $x+\frac{1}{x}, x \in R$ Then the set of possible values of f(x) = ...

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293. Fill in the blank : If 1+ i is a root of the equation $ix^2-3x+p=0$ where $i=\sqrt{-1}$ then the other root is ....

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294. Equation $\cos 2x+7=a(2-\sin x)$ can have a real solution for

A. all real a

B. a lt 2

C. a gt 6

D. $2 = \; < a = \; < 6$

Answer:

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295. If α, β be the roots of $x^2 - x - 1 = 0$ and $A_n = \alpha^n + \beta^n$, then A.M of A_{n-1} and A_n, is

A. $2A_{n-1}$

B. $\frac{1}{2}A_{n+1}$

C. $2A_{n-2}$

D. none of these

Answer:

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296. For all $\lambda \in R$, The equation $ax^2 + (b - \lambda)x + (a - b - \lambda) = 0, a \neq 0$ has real roots. Then

A. $a = b$

B. $b \leq a < 0$

C. $b > a > 0$

D. $a > b > 0$

Answer: B

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297. Prove that $\left(a^2 + b^2\right)x^2 - 2b(a + c)x + \left(b^2 + c^2\right) \geq 0$ for all $x \in R$. If quality holds, find the ratio of the roots of $ax^2 + bx + c = 0$.

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298. Let f(x)= $x^4 - 3x^3 + 2x^2 - 3x + a$.If $f(\sqrt{-1}) = 0$ and $a \in R$ then prove that f (x) < 0 for $x \in (1, 2)$.

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299. If $a_1x^3 + b_1x^2 + c_1x + d_1 = 0$ and $a_2x^3 + b_2x^2 + c_2x + d_2 = 0$ have a pair of repeated roots common, then prove that

$$\begin{vmatrix} 3a_1 & 2b_1 & c_1 \\ 3a_2 & 2b_2 & c_2 \\ a_2b_1 - a_1b_2 & c_1a_2 - c_2a_1 & d_1a_2 - d_2a_1 \end{vmatrix} = 0$$

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300. Find all numbers p for each of which the least value of the quadratic trinomial $4x^2 - 4px + p^2 - 2p + 2$ on the interval $0 \le x \le 2$ is equal to 3

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301. Prove that the equation $x^3 + 2x^2 + x + 4 = 0$ has exactly one root in the open interval (-3,-2).

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