SuperGrads Study Material

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QUANTITATIVE ABILITY

QUADRATIC EQUATION

1. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation whose roots are α/β and β/α is
   (a) $3x^2 - 25x + 3 = 0$ (b) $x^2 + 5x - 3 = 0$
   (c) $x^2 - 5x + 3 = 0$ (d) $3x^2 - 19x + 3 = 0$

2. Difference between the corresponding roots of $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ is same and $a \neq b$, then
   (a) $a + b + 4 = 0$ (b) $a + b - 4 = 0$
   (c) $a - b - 4 = 0$ (d) $a - b + 4 = 0$

3. 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) $p = -2, q = 1$

4. If a , b , c are distinct positive real numbers and $a^2 + b^2 + c^2 = 1$ then $ab + bc + ca$ is
   (a) less than 1 (b) equal to 1 (c) greater than 1 (d) any real no

5. The value of a for which one root of the quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other is
   (a) -2/3 (b) 1/3 (c) -1/3 (d) 2/3

6. If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the squares of their reciprocals, then $\frac{a}{c}, \frac{b}{a}$ and $\frac{c}{b}$ are in
   (a) geometric progression (b) harmonic progression
   (c) arithmetic-geometric progression (d) arithmetic progression

7. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is
   (a) 4 (b) 1 (c) 3 (d) 2

8. Let two numbers have arithmetic mean 9 and geometric mean 4 . Then these numbers are the roots of the quadratic equation
   (a) $x^2 + 18x - 16 = 0$ (b) $x^2 - 18x + 16 = 0$
   (c) $x^2 + 18x + 16 = 0$ (d) $x^2 - 18x - 16 = 0$

9. If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0$ then its roots are
   (a) 0, -1 (b) -1, 1 (c) 0, 1 (d) -1, 2

10. 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) 3 (b) 12 (c) 49/4 (d) 4

11. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals
    (a) 3 (b) -2 (c) 1 (d) 2

12. If both the roots of the quadratic equation $x^2 - 2kx + k^2 + k - 5 = 0$ are less than 5 then k lies in the interval
(a) $(6, \infty)$ (b) (5,6] (c) [4,5] (d) $(-\infty, 4)$

13. If the equation $a_n x^n + a_{n-1}x^{n-1} + \ldots\ldots + a_1 x = 0\ a_1 \neq 0, n \geq 2,$ has a positive root $x = \alpha$, then the equation $na_n x^{n-1} + (n-1)a_{n-1}x^{x-2} + \ldots\ldots\ldots + a_1 = 0$ has a positive root, which is
(a) smaller than α (b) greater than α
(c) equal to α (d) greater than or equal to α

14. All the values of mm for which both roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than -2 but less than 4 , lie in the interval
(a) $-2 < m < 0$ (b) $m > 3$ (c) $-1 < m < 3$ (d) $1 < m < 4$

15. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is
(a) $(3, \infty)$ (b) $(-\infty, -3)$ (c) $(-3,3)$ (d) $(-3, \infty)$

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

17. Let α, β be the roots of x^2-x+p=0 and γ,δ be the roots of x^2-4x+q=0 where p and q are integers if αβγδ, p, y, 5 are in geometric progression then p + q is
(a) -34 (b) 26 (c) 30 (d) -38

18. What is the highest integral value of 'k' for which the quadratic equation x^2 - 6x + k = 0 will have two real and distinct roots?
(a) 9 (b) 7 (c) 3 (d) 8
(e) 12

19. If the equation px^2+ 2qx + r = 0 & dx^2 + 2ex + f = 0 have a common root, and p,q,r are in G.P., then in which type of progression is d/p, e/q , f/r
(a) d/p, e/q, f/r are in G.P (b) B:d/p, e/q, f/r are in AP
(c) C :d/p, e/q, f/r are in H.P (d) D: Insufficient Data

20. If x ε (a, b) satisfies the inequality (x-3)/(x^2+3x+2)>1, then the largest posible value of b- a is
(a) 3 (b) 1
(c) 2 (d) No real value of x satisfies ' the inequality

21. If u^2+(u-2v-l)^2=-4v(u+v), then what is the value of u+3v?
(a) 0 (b) ¼ (c) -1/4 (d) ½

22. The sum of the reciprocals of the roots of the equation px^2+qx+r=O is 10 and the sum of the roots of the equation qx^2+px+r=0 s 20. What is the product of the roots of the equation rx^2+qx+p=0 ?
(a) 0.5 (b) 2 (c) 200 (d) -200

23. N^2=1+2014x2015x2016x2017, What is the value of N?
(a) 4026639 (b) 4062239 (c) 40262639 (d) 40662639

24. 3x + 4|y| = 33. How many integer values of (x, y) are possible?
(a) 6 (b) 3 (c) 4 (d) More than 6

25. What will be the minimum value of the sum of the squares of the roots of the equation x^2-(m-3)x+(m-8)=0 where m is a positive integer.
(a) 9 (b) 16 (c) 25 (d) 36

26. (|x| - 3) (|y| + 4) = 12. How many pairs of integers (x,y) satisfy this equation?
(a) 4 (b) 6 (c) 10 (d) 8

27. The number of roots common between the two equations $x^3+3x^2+4x+7=0$ & $x^3+2x^2+7x+5=0$ is
(a) 0 (b) 1 (c) 2 (d) 3

28. What is the number of real solutions of the equation $x^2 - 7|x| -18 = 0$?
(a) 2 (b) 4 (c) 3 (d) 1

29. Equation $x^2 + 5x — 7 = 0$ has roots a and b. Equation $2x^2 + px + q = 0$ has roots a + 1 and b + 1. Find p + q?
(a) 6 (b) 0 (c) -16 (d) 2

30. $x^4 - 4x^3 + ax^2 - bx + 1 =0$ has positive real roots. What is the maximum possible value of a + b?
(a) 20 (b) 12 (c) 8 (d) 10

31. $X^2 - 9x + |k| = 0$ has real roots. How many integer values can 'k' take?
(a) 40 (b) 21 (c) 20 (d) 41

32. The quadratic equation $x^?$ 4- bx + c = 0 has two roots 4a and 3a, where a is an integer. Which of the following is a possible value of $b^2 + c$?
(a) 3721 (b) 549 (c) 361 (d) 427

33. If p and q are the roots of the equation $ax^2 + bx + c = 0$, find the equation whose roots are p^2 and $-q^2$ given that p – q = 1
(a) $a^2x^2 — b^2x — c^2 = 0$ (b) $a^2x^2 — abx + c^2 = 0$
(c) a^2x^2 4- abx - $c^2 = 0$ (d) $a^2x^2 - ab^2x - c^2 = 0$If a ,0

34. If α, β are the roots of the equation $x^2+x+l=0$,then equation whose roots are α^{19}, β^7 is
(a) $x^2 – x – l = 0$ (b) $x^2 – x + l$
(c) $x^2 + x – l =0$ (d) $x^2 + x + l = 0$

35. If α and β are the roods of the equation $x^2 + x - 1 = 0$, *then what is the equation whose roods are* a^5 *and* β^6?
(a) $x^2 - 7x - 1 = 0$ (b) $x^2 - 7x - 1 = 0$ (c) $x^2 - 11x - 1 = 0$ (d) $x^2 + 11x - 1 = 0$

36. Two quadratic equations are there such that the roots of the first equation are in the ratio 1 : 3 and the roots of the second equation are in the ratio 3 : 5. The sum of roots of both the equations is the same. What is the minimum possible difference of the product of the roots of both the equations, if it is given that the roots of both the equations are intergers?
(a) 0 (b) 3 (c) 6 (d) 9

37. Sum of the roots of a quadratic equation is 5 less than the product of the roots. If one root is 1 more than the other root,
(a) 6 o 3 (b) 12 or 2 (c) 8 or 4 (d) 12 or 4

38. If α and β are the roots of equation $x^2 — 2x + 4 = 0$, then what is the equation whose are α^3/β^2 and β^3/α^2?
(a) x^2-4x+8 = 0 (b) $x^2 — 32x+4 =0$ (c) $x^2 —2x + 4 = 0$ (d) x^2-16x+4 = 0

39. If p and q are the roots of the equation $ax^2 + bx + c = 0$, find the equation whose roots are p/q and q/p.
(a) $acx^2 — (b^2 — 2ac)x + ac = 0$ (b) $x^2 - (b^2 - 2ac\sim)x + 1=0$
(c) $x^2 - (b^2 - 4«c)x +1=0$ (d) $x^2 — (b^2 — 2ac)x + ac = 0$

40. If a+p=4 and $a^3 +0^3 =44$, then a ,0 are the roots of the equation
(a) $2x^2$-7x+6=0 (b) $3x^2$+9x+ll=0
(c) $4x^2$+22x+15=0 (d) $3x^2$-12x+5=0

41. Let a and 0 be the roots of the equations $x^2 + x + 1 =0$ then the equation where roots are a^{22} and 0^{19} is
(a) $x^2 - x + 1 =0$ (b) $x^2 + x + 1 =0$ (c) x^2+x-l=0 (d)x^2-x-l=0

42. If a and p are the roots of equation x^2—x+l = (), then which equation will have roots CL^3 and P^3?
(a) x^2+2x+ 1= 0 (b) x^2— 2x — 1= 0 (c) $x^2 + 3x — 1= 0$ (d) x^2- 3x + 1=0

43. If α and β are the roots of the equations $8x^2 - 3x + 27 = 0$ then the value of $(\frac{\alpha}{\beta^2})^{1/3} + (\frac{\beta}{\alpha^2})^{1/3}$ is

(a) 1/6 (b) none of these (c) 3/2 (d) ¼

44. If α, β are the roots of the quadratic $\alpha + \beta = 8$ and $\alpha - \beta = 2\sqrt{5}$ the which of the following equation will have roots α^4 and β^4

(a) $x^2 - 1522x + 16461 = 0$ (b) $x^2 + 1921x + 14641 = 0$
(c) $x^2 - 1764x + 14641 = 0$ (d) $x^2 + 2520x + 14641 = 0$

45. Two candidates attempt to solve a quadratic equation of the form $x^2 + px + q=O$. One starts with a wrong value of p and finds the roots to be 2 and 6. The other starts with a wrong value of q and finds the roots to be 2 and -9. Find the correct roots and the equation.

46. If one of the lines given by the equation $2x^2 + axy + 3y^2 = 0$ coincide with one of those given by $2x^2 + bxy - 3y^2 = 0$ and the other lines represented by them are perpendicular then $a^2 + b^2$ is

47. If α, β are the roots of the equations $x^2 - 2x + 4 = 0$, then equation whose roots are α^5, β^5 is ?