MATHS

BOOKS - BITSAT GUIDE

QUADRATIC EQUATION

Practice Exercise

1. If $x = \sqrt{1+\sqrt{1+\sqrt{1+\ldots,}}}$ then x is equals

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

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

C. $\frac{-1+\sqrt{5}}{2}$

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

Answer: A

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2. If $a+b+c=0$, then the roots of the equation $4ax^2+3bx+2c=0$, where $a, b, c \in R$, are

A. real and distinct

B. imaginary

C. real and equal

D. infinite

Answer: A

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3. If the roots of the quadratic equation $x^2 - 4x - \log_3 a = 0$ are real, then the least value of a is

A. 81

B. $\frac{1}{81}$

C. $\frac{1}{64}$

D. None

Answer: B

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4. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + h, \beta + h$ are the roots of $px^2 + qx + r = 0$, then h =

A. $\left(\frac{b}{a} - \frac{q}{p}\right)$

B. $\frac{1}{2}\left(\frac{b}{a}-\frac{q}{p}\right)$

C. $-\frac{1}{2}\left(\frac{a}{b}-\frac{p}{q}\right)$

D. None

Answer: B

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5. If the equation $(3x)^2+\left(27\times 3^{1/p}-15\right)x+4=0$ has equal roots, then p =

A. zero

B. 2

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

D. None

Answer: C

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6. If the equation $x^2 + ax + 12 = 0, x^2 + bx + 15 = 9$ and $x^2 + (a+b)x + 36 = 0$ have a common positive root, then the ordered pari (a,b) is

A. $(-6, -7)$

B. $(-7, -8)$

C. $(-6, -8)$

D. $(-8, -7)$

Answer: B

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7. The condition that $x^3 - px - r = 0$ may two of its roots equal to each other but of opposite sign, is

A. $r = pq$

B. $r = 2p^3 + pq$

C. $r = p^2q$

D. None of these

Answer: A

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8. The number of values of k for which the equation $x^2 - 3x + k = 0$ has two distinct roots lying in the interval $(0, 1)$ is

A. three

B. two

C. infinite

D. no value of k will satisfy

Answer: D

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9. If $x^2 + 2bx - 3x = 0$ has no real root and $\frac{3x}{4} < a + b,$ then the rage of c is

A. $(-1, 1)$

B. $(0, 1)$

C. $(0, \infty)$

D. $(-\infty, 0)$

Answer: D

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10. 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, then the product of the roots is

A. $-2\left(p^2+q^2\right)$

B. $-\left(p^2+q^2\right)$

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

D. $-pq$

Answer: C

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11. The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is 2 b. 4 c. 6 d. 8

A. 2

B. 4

C. 7

D. 8

Answer: B

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12. The roots of the equation $|x^2-x-6|=x+2$ are

A. $-2, 1, 4$

B. $0, 2, 4$

C. $0, 1, 4$

D. $-2, 2, 4$

Answer: D

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13. In $\Delta PQR, R = \frac{\pi}{2}$. If $\tan\frac{P}{2}$ and $\tan\frac{Q}{2}$ are the roots of the equation $ax^2 + bx + c = 0,$ then

A. $a = b + c$

B. $b = c + a$

C. $c = a + b$

D. $b = c$

Answer: C

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14. If the roots of the equation $(a+1)x^2 - 3ax + 4a = 0 a \neq -1)$ are greater than unity, then the values of a are

A. $\left[-\frac{16}{7}, -1\right]$

B. $[0, -1]$

C. $\left[-\frac{16}{7}, 1\right]$

D. $[0, 1]$

Answer: A

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15. The number of real roots of equation $(x-1)^2+(x-2)^2+(x-3)^2=0$ is

A. 2

B. 1

C. 0

D. 3

Answer: C

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16. If $y=3^{x-1}+3^{-x-1}$ (where, x is real), then the leastvalue of y is

A. 2

B. 6

C. $2/3$

D. None

Answer: C

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17. If the equation $x^2 - (2+m)x + (m2 - 4m + 4) = 0$ has coincident roots, then

A. $m = 0, m = 1$

B. $m = 0, m = 2$

C. $m = \frac{2}{3}, m = 6$

D. $m = \frac{2}{3}, m = 1$

Answer: C

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18. If α, β are the roots of $x^2 + x + 2 = 0$ and γ, δ are the roots of $x^2 + 3x + 4 = 0$. then $(\alpha + \gamma)(\alpha + \delta)(\beta + \gamma)(\beta + \delta)$ is equal to

A. -18

B. 18

C. 24

D. 44

Answer: D

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19. If $a^2 + b^2 + c^2 = 1$ then $ab + bc + ca$ lies in the interval

A. $[1, 2]$

B. $\left[0, \frac{1}{2}\right]$

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

D. $[0, 1]$

Answer: C

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20. If $x^2 - 5x + 1 = 0$, then $x^5 + \frac{1}{x^5}$ is equal to

A. 2424

B. 3232

C. 2525

D. None

Answer: C

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21. The range of the value of k for which the number 3 lies between the roots of the equation $x^2 + (1 - 2k)x + \left(k^2 - k - 2\right) = 0$ is given by

A. $k < 2$

B. $2 < k < 5$

C. $2 < k < 3$

D. $k > 5$

Answer: B

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22. if α, β, γ are the roots of the equation $x^3 - x - 1 = 0$ then $\frac{1+\alpha}{1-\alpha} + \frac{1+\beta}{1-\beta} + \frac{1+\gamma}{1-\gamma}$ is

A. 0

B. -1

C. -7

D. 1

Answer: C

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23. If one root of the equation $x^2 - \lambda x + 12 = 0$ is even prime while $x^2 + \lambda x + \mu = 0$ has equal roots, then μ is

A. 8

B. 16

C. 24

D. 32

Answer: B

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24. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then $\left(1 + \alpha + \alpha^2\right)\left(1 + \beta + \beta^2\right)$ is equal to

A. 0

B. positive

C. negative

D. None

Answer: B

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25. The number of real solutions of the equation $\left(5+2\sqrt{6}\right)^{x^2-3}+\left(5-2\sqrt{6}\right)^{x^2-3}=10$ is-

A. 2

B. 4

C. 6

D. None

Answer: B

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

A. both roots in [a,b]

B. both roots in $(-\infty, a)$

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

D. one root in $(-\infty, a)$

Answer: D

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27. If α 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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28. If the roots of the equation $lx^2 + mx + |m = 0$ are in ratio a:b then the value of $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}} + \sqrt{\frac{m}{l}}$ is equal to

A. 0

B. 1

C. 3

D. None

Answer: A

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29. For the equation $3x^2 + px + 3 = 0, p > 0,$ if one of the root is square of the other, then p is equal to $1/3$ b. 1 c. 3 d. $2/3$

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

B. 1

C. 3

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

Answer: C

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30. Q. If $x^2 + 5 = 2x - 4\cos(a + b),$ where $a, b \in (0, 5)$ is satisfied for at least one real x, then the maximum value of

$a + b \in [0, 2\pi]$ is

A. 3π

B. 2π

C. π

D. None of these

Answer: C

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

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

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

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

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

Answer: A

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32. The value of p for which the difference between the roots of the equation $x^2+px+8=0$ is 2, are

A. ± 3

B. ± 6

C. ± 2

D. ± 1

Answer: B

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33. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then the quadratic equation whose roots are $\frac{\alpha}{1+\alpha}$ and $\frac{\beta}{1+\beta}$, is

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

B. $ax^2 - b(x-1) + c(x-1)^2 = 0$

C. $ax^2 + b(1-x) + c(1-x)^2 = 0$

D. $ax^2 + b(x+1) + c(1+x)^2 = 0$

Answer: C

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34. If $a + b + c > \frac{9c}{4}$ and quadratic equation $ax^2 + 2bx - 5c = 0$ has non-real roots, then-

A. $a > 0, c > 0$

B. $a > 0, c < 0$

C. $a < 0, c < 0$

D. $a < 0, c > 0$

Answer: B

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35. For real values of x, the expression $\frac{(x-b)(x-c)}{(x-a)}$ will assume all real values provided

A. $a \leq c \leq b$

B. $a \geq a \geq c$

C. $b \leq c \leq a$

D. $a \geq b \geq c$

Answer: B

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1. If α and β are the roots of the equation $x^2 - px + q = 0$ then the value of $(\alpha+\beta)x - \left(\frac{\alpha^2+\beta^2}{2}\right)x^2 + \left(\frac{\alpha^3+\beta^3}{3}\right)x^3 + \ldots$ is

A. $\log\left(1 - px + qx^2\right)$

B. $\log\left(1 + px - qx^2\right)$

C. $\log\left(1 + px + qx^2\right)$

D. None of these

Answer: A

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2. 3 The set of all real x satisfying the inequality $\frac{3-|x|}{4-|x|} \geq 0$

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

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

C. $(-\infty, -3) \cup (4, \infty)$

D. $(-\infty, -3) \cup (3, \infty)$

Answer: A

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3. If N is any four digit number say x_1, x_2, x_2, x_4 then the maximum of $\frac{N}{x_1 + x_2 + x_3 + x_4}$ is equal to

A. 1000

B. $\frac{1111}{4}$

C. 800

D. None

Answer: D

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4. If 4 - 5i is a root of the quadratic equation $x^2 + ax + b = 0$ then (a, b) is equal

A. $(8, 41)$

B. $(-8, 41)$

C. $(41, 8)$

D. $(-41, 8)$

Answer: B

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5. If α and β are the roots of the quadratic equation $4x^2 + 3x + 7 = 0$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is

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

B. $-\frac{3}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer: B

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6. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + k, \beta + k$ are the roots of $px^2 + qx + r = 0$, then $\frac{b^2 - 4ac}{q^2 - 4pr}$ is equal to

A. $\frac{a}{p}$

B. 1

C. $\left(\frac{a}{p}\right)^2$

D. 0

Answer: C

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7. If α and β are the roots of the equation $x^2 - 2x + 4 = 0$, then the value of $\alpha^n + \beta^n$ will be

A. $i2\sin^{n+1}\sin(n\pi/3)$

B. $2^{n+1}\cos(n\pi/3)$

C. $i2^{n-1}\sin(n\pi/3)$

D. $2^{n-1}\cos(n\pi/3)$

Answer: B

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8. If the roots of the equation $ax^2 + bx + c = 0$ are real and distinct, then

A. both roots are greater than $-\frac{b}{2a}$

B. both roots are greater than $-\frac{b}{2a}$

C. one of the roots exceeds $-\frac{b}{2a}$

D. None of the above

Answer: C

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9. The number of jsolutions of the equation $z^2 + \bar{z} = 0,$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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10. If the sum of the roots of the equation $z^2\bar{z} = 0$ is

A. $-2/3$

B. -3

C. 4

D. $-1/2$

Answer: D

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11. If $\alpha+\beta=-2$ and $\alpha^3+\beta^3=-56$ then the quadratic equation whose roots are α, β is.

A. $x^2+2x-16=0$

B. $x^2+2x+15=0$

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

D. $x^2+2x-8=0$

Answer: D

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12. The cubic equation whose roots are thrice to each of the roots of $x^3 + 2x^2 - 4x + 1 = 0$ is

A. $x^3 - 6x^2 + 36x + 27 = 0$

B. $x^3 + 6x^2 + 36x + 27 = 0$

C. $x^3 - 6x^2 - 36x + 27 = 0$

D. $x^3 + 6x^2 - 36x + 27 = 0$

Answer: D

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13. The number of solutionsof the equation

$1 + \sin x \sin^2 \frac{x}{2} = 0$ in $[-\pi, \pi]$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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

A. a

B. $-b$

C. $\frac{1}{b^{n+1}}$

D. $-b^{n+1}$

Answer: B

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15. If α, β, γ are the roots of the equation $2x^3 - 3x^2 + 6x + 1 = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to

A. $-\frac{15}{4}$

B. $\frac{15}{4}$

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

D. 4

Answer: A

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16. If $\sin\alpha, \sin\beta$ and $\cos\alpha$ are in GP, then roots of $x^2 + 2x\cot\beta + 1 = 0$ are always

A. real

B. imaginary

C. greater than 1

D. equal

Answer: A

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