

Quadratic Equations & Inequations

Date Planned : ___ / ___ / ___	Daily Tutorial Sheet – 1	Expected Duration : 90 Min
Actual Date of Attempt : ___ / ___ / ___	JEE Advanced (Archive)	Exact Duration: _____

1. Let α and β be the roots of equation $px^2 + qx + r = 0$, $p \neq 0$. If p , q and r are in AP and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then the value of $|\alpha - \beta|$ is: (2014)
 (A) $\frac{\sqrt{61}}{9}$ (B) $\frac{2\sqrt{17}}{9}$ (C) $\frac{\sqrt{34}}{9}$ (D) $\frac{2\sqrt{13}}{9}$
2. Let p and q be real numbers such that $p \neq 0$, $p^3 \neq q$ and $p^3 \neq -q$. If α and β are non-zero complex numbers satisfying $\alpha + \beta = -p$ and $\alpha^3 + \beta^3 = q$, then a quadratic equation having $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ as its roots is: (2010)
 (A) $(p^3 + q)x^2 - (p^3 + 2q)x + (p^3 + q) = 0$ (B) $(p^3 + q)x^2 - (p^3 - 2q)x + (p^3 + q) = 0$
 (C) $(p^3 - q)x^2 - (5p^3 - 2q)x + (p^3 - q) = 0$ (D) $(p^3 - q)x^2 - (5p^3 + 2q)x + (p^3 - q) = 0$
3. If a , b , c are the sides of a triangle ABC such that $x^2 - 2(a + b + c)x + 3\lambda(ab + bc + ca) = 0$ has real roots, then: (2006)
 (A) $\lambda < \frac{4}{3}$ (B) $\lambda > \frac{5}{3}$ (C) $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$ (D) $\lambda \in \left(\frac{1}{3}, \frac{5}{3}\right)$
4. If α and β are the real roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always: (1989)
 (A) two real-roots (B) two positive roots
 (C) two negative roots (D) one positive and one negative root
5. The sum of all real values of x satisfying the equation $(x^2 - 5x + 5)^{x^2 + 4x - 60} = 1$ is: ▶
 (A) -4 (B) 6 (C) 5 (D) 3
6. If a, b, c, d are non-zero real and distinct and $x^2 - 10ax - 11b = 0$ have roots c and d . $x^2 - 10cx - 11d = 0$ have roots a and b , then find $a + b + c + d$. (2006) ▶
7. If α, β are the roots of $ax^2 + bx + c = 0$, ($a \neq 0$) and $\alpha + \delta, \beta + \delta$ are the roots of $Ax^2 + Bx + C = 0$, ($A \neq 0$) for some constant δ , then prove that $\frac{b^2 - 4ac}{a^2} = \frac{B^2 - 4AC}{A^2}$. (2000)
8. If one root of the quadratic equation $ax^2 + bx + c = 0$ is equal to the n th power of the other, then show that $(ac^n)^{\frac{1}{n+1}} + (a^n c)^{\frac{1}{n+1}} + b = 0$. (1983) ▶
9. If α and β are the roots of $x^2 + px + q = 0$ and γ, δ are the roots of $x^2 + rx + s = 0$, then evaluate $(\alpha - \gamma)(\beta - \gamma)(\alpha - \delta)(\beta - \delta)$ in terms of p, q, r and s . (1979) ▶
10. If α and β are the roots of the equation $x^2 + px + 1 = 0$; γ, δ are the roots of $x^2 + qx + 1 = 0$, then find $(\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta)$ (1978)