

1. Let α and β be the roots of $x^2 - 6x - 2 = 0$, with $\alpha > \beta$. If

$a_n = \alpha^n - \beta^n$ for $n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{a_9}$ is

[2011]

- (a) 1 (b) 2 (c) 3 (d) 4.

Solution: (c) $\because \alpha, \beta$ are roots of $x^2 - 6x - 2 = 0$

$$\therefore x^2 - 6x - 2 = 0$$

$$\Rightarrow \alpha^{10} - 6\alpha^9 - 2\alpha^8 = 0$$

$$\Rightarrow \alpha^{10} - 2\alpha^8 = 6\alpha^9 \quad \text{--- (1)}$$

$$\text{Similarly } \beta^{10} - 2\beta^8 = 6\beta^9 \quad \text{--- (2)}$$

On subtracting (2) from (1),

$$\alpha^{10} - \beta^{10} - 2(\alpha^8 - \beta^8) = 6(\alpha^9 - \beta^9)$$

$$\Rightarrow \alpha^{10} - \beta^{10} - 2a_8 = 6a_9 \Rightarrow \frac{a_{10} - 2a_8}{2a_9} = \boxed{3}$$