Question 1: Let α and β be the roots of $x^2-6x-2 = 0$, with α > β. If $a_n = \alpha^n - \beta^n$ for n≥1, then the value of $(a_{10}-2a_8)/2a_9$ is

(a) 1

(b) 2

(c) 3

(d) 4

Solution:

Given $x^2-6x-2 = 0$

α and β are the roots of above equation.

So $\alpha + \beta = 6$

$\alpha\beta = -2$

Given $a_n = \alpha^n - \beta^n$

$(a_{10}-2a_8)/2a_9 = [(\alpha^{10} - \beta^{10}) - 2(\alpha^8 - \beta^8)]/2(\alpha^9 - \beta^9)$

$= [\alpha^8(\alpha^2 - 2) - \beta^8(\beta^2 - 2)]/2(\alpha^9 - \beta^9)$

$= [\alpha^8(6\alpha) - \beta^8(6\beta)]/2(\alpha^9 - \beta^9)$ (since $\alpha^2-6\alpha-2 = 0$ and $\beta^2-6\beta-2 = 0$)

$= 6(\alpha^9 - \beta^9)/2(\alpha^9 - \beta^9)$

$= 6/2$

$= 3$

Hence option c is the answer.