

$$a_0 = 1 \quad \Rightarrow \quad a_n = 3^{-n} a_{n-1}$$

$$\begin{aligned} a_n &= 3^{-n} a_{n-1} \\ &= 3^{-n} \times 3^{-(n-1)} a_{n-2} \end{aligned}$$

⋮

$$= 3^{-(n + (n-1) + \dots + 1)} a_0$$

$$\Rightarrow a_n = 3^{-\sum n} = \left(\frac{1}{3}\right)^{\sum n}$$

Now

$$\frac{1}{R} = \lim_{n \rightarrow \infty} \sup |a_n|^{\frac{1}{n^2}} = \lim_{n \rightarrow \infty} \sup \left(\frac{1}{3}\right)^{\frac{n(n+1)}{2n^2}} = \frac{1}{\sqrt{3}}$$

Thus $\boxed{R = \sqrt{3}}$ Ans