Q-1) Find $\lim_{n\to\infty} a_n$, where $a_n = \left(1 + \dfrac{2}{3n}\right)^{4n}$, $n = 1, 2, \ldots$.

Solution:

$a_n = \left[\left(1 + \dfrac{2/3}{n}\right)^{n}\right]^{4} \longrightarrow \left[e^{2/3}\right]^{4} = e^{8/3}$ as $n \to \infty$.

Or you can consider $\ln a_n = \dfrac{\ln(1 + 2/3n)}{1/4n}$ and use L'Hopital's rule as $n \to \infty$.