

Some facts from calculus which are useful:

when $|a| < 1$, for any $p \in \mathbb{R}$, $\lim_{n \rightarrow \infty} n^p a^n = 0$,

when $a > 0$ $\lim_{n \rightarrow \infty} \sqrt[n]{a} = 1$,

$\lim_{n \rightarrow \infty} \sqrt[n]{n} = 1$,

$e^t = \lim_{n \rightarrow \infty} \left(1 + \frac{t}{n}\right)^n$,

$f(x) = f(a) + \int_a^x f'(t) dt$