

Define

$$\begin{aligned}g(x) &= \frac{\arctan(x)}{x} \\h(x) &= \sqrt{2e^{-x} - 1} \\F(x) &= g(h(x)).\end{aligned}$$

Let  $F(z) = \sum_{n=0}^{\infty} a_n z^n$  be the power series for  $F$  in a neighborhood of the origin. Determine the exponential growth rate

$$c := \limsup_{n \rightarrow \infty} |a_n|^{1/n}$$

or equivalently its logarithm

$$\gamma := \limsup_{n \rightarrow \infty} \frac{1}{n} \log |a_n|.$$