

1

1.1

$$\begin{aligned}\lim_{x \rightarrow \infty} f(x) &= \lim_{x \rightarrow \infty} \tan^{-1} x + \lim_{x \rightarrow \infty} \tan^{-1} \frac{1}{x} \\ &= \frac{\pi}{2} + 0 = \underline{\underline{\frac{\pi}{2}}}\end{aligned}$$

1.2

$x = \tan y$ の両辺を x で微分すると

$$\begin{aligned}1 &= \frac{1}{\frac{1}{1+\tan^2 y}} \cdot \frac{dy}{dx} \\ \Leftrightarrow \frac{dy}{dx} &= \frac{1}{1+\tan^2 y} = \frac{1}{1+x^2}\end{aligned}$$

これより,

$$\begin{aligned}f'(x) &= \frac{1}{1+x^2} + \frac{1}{1+\left(\frac{1}{x}\right)^2} \cdot -\left(\frac{1}{x}\right)^2 \\ &= \underline{\underline{0}}\end{aligned}$$