



次の極限值を求めよ。

$$\lim_{x \rightarrow \infty} \{x \log(2x+1) - \log 2x\}$$

与式より

$$\begin{aligned} & \lim_{x \rightarrow \infty} \left\{ x \log \left( \frac{2x+1}{2x} \right) \right\} \\ &= \lim_{x \rightarrow \infty} \left\{ x \log \left( 1 + \frac{1}{2x} \right) \right\} \quad \begin{array}{l} 2x = t \text{ とおくと} \\ x = \frac{t}{2} \text{ より} \end{array} \\ &= \lim_{t \rightarrow \infty} \frac{t}{2} \log \left( 1 + \frac{1}{t} \right) \\ &= \frac{1}{2} \lim_{t \rightarrow \infty} t \log \left( 1 + \frac{1}{t} \right) \\ &= \frac{1}{2} \lim_{t \rightarrow \infty} \log \left( 1 + \frac{1}{t} \right)^t \\ &= \frac{1}{2} \log e \\ &= \frac{1}{2} \end{aligned}$$

