

①

微分積分解法 2017 レポート (4回目)

問1. 次の関数の微分を求めよ.

$$f(x) = (1 + e^x)^{\log x}$$

$$f'(x) = \left(\frac{\boxed{(1)}}{x} \log(1 + e^x) + \frac{e^x}{1 + e^x} \log x \right) \times (1 + e^x)^{\log x}$$

問2. 次の関数の二次導関数を求めよ.

$$f(x) = \sqrt{x-2}$$

$$f''(x) = -\frac{1}{\boxed{(2)}} (x-2)^{-\frac{3}{2}}$$

$$\begin{cases} \boxed{(1)} = 1 \\ \boxed{(2)} = 4 \end{cases}$$

問1.

$$\begin{aligned} f(x) &= (1+e^x)^{\log x} \\ &= e^{\log x \cdot \log(1+e^x)} \end{aligned}$$

$$\begin{aligned} f'(x) &= \{ \log x \cdot \log(1+e^x) \}' (1+e^x)^{\log x} \\ &= \left\{ \frac{1}{x} \log(1+e^x) + \log x \frac{e^x}{1+e^x} \right\} \\ &\quad \times (1+e^x)^{\log x} \end{aligned}$$

問2.

$$f'(x) = \frac{1}{2} \frac{1}{\sqrt{x-2}}$$

$$\begin{aligned} f''(x) &= \frac{1}{2} \left(-\frac{1}{2}\right) (x-2)^{-\frac{3}{2}} \\ &= -\frac{1}{4} (x-2)^{-\frac{3}{2}} \end{aligned}$$