

数学演習 (1) 第 7 回 ロピタルの定理 解答

- I. (1) $\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{\sin 2x} = 1$
(2) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x - \cos x} = 0$
(3) $\lim_{x \rightarrow \infty} \frac{\log x}{x^a} = 0$
(4) $\lim_{x \rightarrow \infty} \frac{x}{e^{ax}} = 0$
(5) $\lim_{x \rightarrow \infty} \frac{x^a}{e^{bx}} = 0$
(6) $\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$
(7) $\lim_{x \rightarrow 0} \frac{\tan ax}{\log(1 + bx)} = \frac{a}{b}$
(8) $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x} = \log \frac{a}{b}$
(9) $\lim_{x \rightarrow 0} \frac{\log(1 + x) - x}{x^2} = -\frac{1}{2}$
(10) $\lim_{x \rightarrow 0} \frac{\arctan x - x}{x^3} = -\frac{1}{3}$
(11) $\lim_{x \rightarrow 0} \frac{x - \sin x}{1 - \cos x} = 0$
(12) $\lim_{x \rightarrow 0} \frac{x - \sin x}{x(1 - \cos x)} = \frac{1}{3}$
(13) $\lim_{x \rightarrow \infty} \frac{\log(1 + x^2)}{\log(1 + x)} = 2$
(14) $\lim_{x \rightarrow 0} \frac{\tan x - x}{x^3} = \frac{1}{3}$
(15) $\lim_{x \rightarrow +0} x^a \log x = 0$
(16) $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{e^x - 1} \right) = \frac{1}{2}$
(17) $\lim_{x \rightarrow 0} (e^x + x)^{1/x} = e^2$