2018.6.8

数学演習 (1)　第 7 回　ロピタルの定理　解答

I. (1) $\lim_{x\to 0} \dfrac{e^x - e^{-x}}{\sin 2x} = \dfrac{2}{3}$

(2) $\lim_{x\to 1} \dfrac{e^x - 1}{x - \cos x} = 0$

(3) $\lim_{x\to \infty} \dfrac{\log x}{x^a} = 0$

(4) $\lim_{x\to \infty} \dfrac{x}{e^{ax}} = 0$

(5) $\lim_{x\to \infty} \dfrac{x^a}{e^{bx}} = 0$

(6) $\lim_{x\to 0} \dfrac{\tan ax}{\log(1+bx)} = \dfrac{a}{b}$

(7) $\lim_{x\to 0} \dfrac{a^x - b^x}{x} = \log \dfrac{a}{b}$

(8) $\lim_{x\to 0} \dfrac{\log(1+x) - x}{x^2} = -\dfrac{1}{2}$

(9) $\lim_{x\to 0} \dfrac{\arctan x - x}{x^3} = -\dfrac{1}{3}$

(10) $\lim_{x\to 0} \dfrac{x - \sin x}{1 - \cos x} = 0$

(11) $\lim_{x\to 0} \dfrac{x - \sin x}{x(1 - \cos x)} = \dfrac{1}{3}$

(12) $\lim_{x\to 0} \dfrac{\tan x - x}{x^3} = \dfrac{1}{3}$

II. (1) $\lim_{x\to +0} x^a \log x = 0$

II. (1) $\lim_{x\to \pi/2} \left(\dfrac{\pi}{2} - x\right) \tan x = 1$

(3) $\lim_{x\to 0} \left(\dfrac{1}{x} - \dfrac{1}{\sin x}\right) = 0$

(4) $\lim_{x\to 0} \left(\dfrac{1}{x} - \dfrac{1}{e^x - 1}\right) = \dfrac{1}{2}$

III. (1) $\lim_{x\to \infty} (e^x + x)^{1/x} = e$

(2) $\lim_{x\to 0} (e^x + x)^{1/x} = e^2$