微積 I 試験予想問題 解説

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(1)

$$\lim_{x\to 0}\frac{\sin 3x}{\sin 7x}=\frac{3}{7}$$

(2)

$$\lim_{x\to \frac{\pi}{2}}\frac{\cos x}{x-\frac{\pi}{2}}$$

$t=x-\frac{\pi}{2}$ とおくと，$t\to 0$ だから，

$$\begin{aligned}=\lim_{t\to 0}\frac{\cos(t+\frac{\pi}{2})}{t}&=\lim_{t\to 0}\frac{-\sin t}{t}\\&=-1\end{aligned}$$

(3)

$$\begin{aligned}\lim_{x\to 0}\frac{\sin(\sin^2 x)}{x^2}&=\lim_{x\to 0}\left(\frac{\sin(\sin^2 x)}{\sin^2 x}\cdot\frac{\sin^2 x}{x^2}\right)\\&=1\end{aligned}$$

(4)

$$\begin{aligned}\lim_{x\to 0}\frac{2x\tan(3x^2)}{\sin(2x^3)}&=\lim_{x\to 0}\left(\frac{2x}{\sin(2x^3)}\cdot\frac{\tan(3x^2)}{3x^2}\cdot 3x^2\right)\\&=\lim_{x\to 0}\left(\frac{6x^3}{\sin(2x^3)}\cdot\frac{\sin(3x^2)}{3x^2}\cdot\frac{1}{\cos(3x^2)}\right)=3\end{aligned}$$