

$$\begin{aligned}
 (7) \quad & \sum_{k=1}^{\infty} \left(\frac{1}{3}\right)^{k-1} \\
 &= \lim_{k \rightarrow \infty} \sum_{n=1}^k 1 \cdot \left(\frac{1}{3}\right)^{n-1} \\
 &= \lim_{k \rightarrow \infty} \frac{1(1 - (\frac{1}{3})^k)}{1 - \frac{1}{3}} \\
 &= \lim_{k \rightarrow \infty} \frac{3}{2} \left\{1 - \left(\frac{1}{3}\right)^k\right\} \\
 &= \frac{3}{2} \rightarrow
 \end{aligned}$$

[36] 次の関数の極限を求めよ.

$$\begin{aligned}
 (1) \quad & \lim_{x \rightarrow 2} (x^3 - 3x^2 + 3x - 1) \\
 &= 8 - 12 + 6 - 1 \\
 &= 1 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad & \lim_{x \rightarrow \pi} \frac{\cos x}{x} \\
 &= \frac{\cos \pi}{\pi} = -\frac{1}{\pi} \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad & \lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x^2 - 4} \\
 &= \lim_{x \rightarrow 2} \frac{(x-2)(x+3)}{(x-2)(x+2)} \\
 &= \frac{5}{4} \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad & \lim_{x \rightarrow 0} \frac{1}{x} \left(1 + \frac{1}{x-1}\right) \\
 &= \lim_{x \rightarrow 0} \frac{1}{x} \cdot \frac{x}{x-1} \\
 &= -1 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad & \sum_{n=1}^{\infty} 3 \left(\frac{1}{2}\right)^{n-3} \\
 &= \lim_{k \rightarrow \infty} \sum_{n=1}^k 12 \left(\frac{1}{2}\right)^{n-1} \\
 &= \lim_{k \rightarrow \infty} \frac{12(1 - (\frac{1}{2})^k)}{1 - \frac{1}{2}} \\
 &= 24 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad & \lim_{x \rightarrow 1} \frac{x-1}{x^2+1} \\
 &= \frac{0}{2} = 0 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad & \lim_{x \rightarrow 0} 2^x (x^2 - 2x - 3) \\
 &= 1(0 - 0 - 3) = -3 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (6) \quad & \lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 - 3x + 2} \\
 &= \lim_{x \rightarrow 1} \frac{(x+1)(x-1)}{(x-2)(x-1)} \\
 &= -2 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad & \lim_{x \rightarrow -2} \frac{1}{x+2} \left(2 + \frac{4}{x}\right) \\
 &= \lim_{x \rightarrow -2} \frac{1}{x+2} \cdot \frac{2(x+2)}{x} \\
 &= \lim_{x \rightarrow -2} \frac{2}{x} = -1 \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (9) \quad & \lim_{x \rightarrow -1} \frac{\sqrt{x^2+3} + 2x}{x+1} \\
 &= \lim_{x \rightarrow -1} \frac{x^2+3-4x^2}{(x+1)(\sqrt{x^2+3}-2x)} \\
 &= \lim_{x \rightarrow -1} \frac{-3(x^2-1)}{(x+1)(\sqrt{x^2+3}-2x)} \\
 &= \lim_{x \rightarrow -1} \frac{-3(x-1)(x+1)}{(\sqrt{x^2+3}-2x)(x+1)} \\
 &= \lim_{x \rightarrow -1} \frac{-3(x-1)}{\sqrt{x^2+3}-2x} \\
 &= \frac{6}{2+2} = \frac{3}{2} \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (12) \quad & \lim_{x \rightarrow -\infty} \frac{x^3+2}{x-1} \\
 &= \lim_{x \rightarrow -\infty} \frac{x^3(1+\frac{2}{x^3})}{x(1-\frac{1}{x})} \\
 &= \lim_{x \rightarrow -\infty} x^2 = \infty \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (10) \quad & \lim_{x \rightarrow 0} \frac{\sqrt{3x^2+2x+1} - \sqrt{1+3x}}{3x} \\
 &= \lim_{x \rightarrow 0} \frac{3x(x-\frac{1}{3})}{3x(\sqrt{3x^2+2x+1} + \sqrt{1+3x})} \\
 &= \lim_{x \rightarrow 0} \frac{x-\frac{1}{3}}{\sqrt{3x^2+2x+1} + \sqrt{1+3x}} \\
 &= \frac{-\frac{1}{3}}{2} = -\frac{1}{6} \rightarrow
 \end{aligned}$$

$$\begin{aligned}
 (11) \quad & \lim_{x \rightarrow -\infty} (1 - \frac{1}{x^2}) \\
 &= 1 \rightarrow
 \end{aligned}$$