

次の無限級数の和を求めよ。

$$(1) \sum_{n=1}^{\infty} \frac{2^n - 3^n}{6^n}$$

$$(2) \sum_{n=1}^{\infty} \frac{3^{n+1} + 2^{n+1}}{6^n}$$

$$(3) \sum_{n=1}^{\infty} \frac{5^n + 2^n}{10^n}$$

$$(4) \sum_{n=1}^{\infty} \frac{3^n - 5^n}{15^n}$$

[練習問題]

$$(1) \text{ 和} = \sum_{n=1}^{\infty} \left( \frac{1}{3^n} - \frac{1}{2^n} \right) = \frac{\frac{1}{3}}{1 - \frac{1}{3}} - \frac{\frac{1}{2}}{1 - \frac{1}{2}} = \frac{1}{2} - 1 = -\frac{1}{2}$$

$$(2) \text{ 和} = \sum_{n=1}^{\infty} \left( \frac{3}{2^n} + \frac{2}{3^n} \right) = \frac{\frac{3}{2}}{1 - \frac{1}{2}} + \frac{\frac{2}{3}}{1 - \frac{1}{3}} = 3 + 1 = 4$$

$$(3) \text{ 和} = \sum_{n=1}^{\infty} \left( \frac{1}{2^n} + \frac{1}{5^n} \right) = \frac{\frac{1}{2}}{1 - \frac{1}{2}} + \frac{\frac{1}{5}}{1 - \frac{1}{5}} = 1 + \frac{1}{4} = \frac{5}{4}$$

$$(4) \text{ 和} = \sum_{n=1}^{\infty} \left( \frac{1}{5^n} - \frac{1}{3^n} \right) = \frac{\frac{1}{5}}{1 - \frac{1}{5}} - \frac{\frac{1}{3}}{1 - \frac{1}{3}} = \frac{1}{4} - \frac{1}{2} = -\frac{1}{4}$$