2017　東京都市大

$$\lim_{n\to\infty}\frac{3^{n-1}-4^{n+1}}{2^{2n+3}+3^{n+2}}$$

分子・分母を 4^n で割る

$$=\lim_{n\to\infty}\frac{\dfrac{3^{n-1}}{4^n}-\dfrac{4^{n+1}}{4^n}}{\dfrac{2^{2n+3}}{4^n}+\dfrac{3^{n+2}}{4^n}}$$

$$= \lim_{n\to\infty} \frac{\dfrac{3^{n-1}}{4^n} - \dfrac{4^{n+1}}{4^n}}{\dfrac{2^{2n+3}}{4^n} + \dfrac{3^{n+2}}{4^n}}$$

$$= \lim_{n\to\infty} \frac{\dfrac{3^n \cdot 3^{-1}}{4^n} - \dfrac{4^n \cdot 4^1}{4^n}}{\dfrac{2^{2n} \cdot 2^3}{4^n} + \dfrac{3^n \cdot 3^2}{4^n}}$$

$$= \lim_{n\to\infty} \frac{\dfrac{3^n \cdot 3^{-1}}{4^n} - \dfrac{4^n \cdot 4}{4^n}}{\dfrac{2^{2n} \cdot 2^3}{4^n} + \dfrac{3^n \cdot 3^2}{4^n}}$$

$$= \lim_{n\to\infty} \frac{\dfrac{3^n}{4^n} \cdot 3^{-1} - \quad 4}{\dfrac{2^{2n}}{4^n} \cdot 2^3 + \dfrac{3^n}{4^n} \cdot 3^2}$$

$$= \lim_{n\to\infty} \frac{\dfrac{3^n}{4^n}\cdot 3^{-1} - \quad 4}{\dfrac{2^{2n}}{4^n}\cdot 2^3 + \dfrac{3^n}{4^n}\cdot 3^2}$$

$$\bullet^{\bigstar\times\blacktriangle} = (\bullet^{\bigstar})^{\blacktriangle}$$

$$= \lim_{n\to\infty} \frac{\left(\dfrac{3}{4}\right)^n\cdot\dfrac{1}{3} - \quad 4}{\dfrac{\cancel{4^n}}{\cancel{4^n}}\cdot 8 + \left(\dfrac{3}{4}\right)^n\cdot 9}$$

$$\bullet^{-\bigstar} = \frac{1}{\bullet^{\bigstar}}$$

$$= \lim_{n\to\infty} \frac{\left(\frac{3}{4}\right)^n \cdot \frac{1}{3} - \quad 4}{\frac{4^n}{4^n} \cdot 8 + \left(\frac{3}{4}\right)^n \cdot 9}$$

$$= \lim_{n\to\infty} \frac{\left(\frac{3}{4}\right)^n \cdot \frac{1}{3} - \quad 4}{8 + \left(\frac{3}{4}\right)^n \cdot 9}$$

$$= \lim_{n\to\infty} \frac{\left(\frac{3}{4}\right)^n \cdot \frac{1}{3} - 4}{8 + \left(\frac{3}{4}\right)^n \cdot 9}$$

$$= \frac{0 \cdot \frac{1}{3} - 4}{8 + 0 \cdot 9} = \frac{-4}{8} = \frac{-1}{2}$$ 答