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Date.

1) a. Tulis rumus eksplisit dan kekonvergenannya

$\cos \pi, \frac{\cos 2\pi}{4}, \frac{\cos 3\pi}{9}, \frac{\cos 4\pi}{16}$

Rumus eksplisit : $\frac{\cos n\pi}{n^2}$

kekonvergenan :

$\lim_{n \to \infty} \frac{\cos n\pi}{n^2} = 0$ konvergen

1) c. $a_n = \frac{\sin n\pi}{4}$

$-1 \leq \frac{\sin n\pi}{4} \leq 1$ => divergen

* bukan barisan monoton

1) b. Diketahui $\lim_{n \to \infty} a_n = A$; $\lim_{n \to \infty} b_n = B$

$\lim_{n \to \infty} (a_n \pm b_n) = A \pm B = A + B$

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untuk pembuktian, maka $|a_n + b_n - (A+B)| < \varepsilon$

* $\{a_n\}$ konvergen ke $A \Rightarrow L = A$, akan dibuktikan : untuk setiap $\varepsilon > 0$ terdapat $N > 0$ sehingga $n \geq N$

$|a_n - L| < \frac{\varepsilon}{2}$

$|a_n - A| < \frac{\varepsilon}{2}$

* $\{b_n\}$ konvergen ke $B \Rightarrow L = B$, akan dibuktikan untuk setiap $\varepsilon > 0$ terdapat $N > 0$, sehingga $n \geq N$

$|b_n - L| < \frac{\varepsilon}{2}$

$|b_n - B| < \frac{\varepsilon}{3}$

- $|(a_n + b_n) - (A+B)| \leq |a_n - A| + |b_n - B| < \frac{\varepsilon}{2} + \frac{\varepsilon}{2} = \varepsilon$

(terbukti)

2) a. $1, -\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \frac{1}{5}, -\frac{1}{6}, \ldots$

Rumus eksplisit

$$(-1)^{n+1} \cdot \frac{1}{n}$$

Kekonvergenan

$$\lim_{n \to \infty} (-1)^{n+1} \cdot \frac{1}{n}$$

$$\lim_{n \to \infty} \frac{1}{n} = 0$$ * konvergen

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2) b. $a_n = \frac{3-8.2^n}{5+4.2^n}$

kekonvergenan : $\lim_{n\to\infty} \frac{3-8.2^n}{5+4.2^n}$

$\lim_{n\to} \frac{3-16^n}{5+8^n}$

$\lim_{n\to\infty} \frac{0-16}{0+8} = -2$ (konvergen)

c. $a_n = \frac{\ln n}{n}$

Kemonotonan $a_n - a_{n+1} = \frac{\ln n}{n} - \frac{\ln n+1}{n+1}$

$= \frac{\ln n(n+1) - \ln n(n+1)}{n(n+1)}$

$= \frac{\ln n(n+1) - \ln n(n+1)}{n(n+1)}$

$\boxed{\text{bukan barisan monoton}}$

Limit

$\lim_{n\to\infty} \frac{\ln n}{n} = 0$ Konvergen

3) a. 0.9, 0.99, 0.999, 0.9999, . . .

rumus eksplisit : $\left(1-\frac{1}{10}^{n}\right)$

kekonvergenan :

$$\lim_{n\to\infty}\left(1-\frac{1}{10}^{n}\right)$$

$$(1-0) = 1 \quad \text{(konvergen)}$$

3) b. $a_n = \frac{n+3}{3n-2}$

kekonvergenan

$$\lim_{n\to\infty}\frac{n+3}{3n-2} = \frac{1}{3} \quad \text{konvergen}$$

3 c. $a_n = \frac{n!}{10^n}$

kemonotonan $\Rightarrow a_n - a_{n+1} = \frac{n!}{10^n} - \frac{n!+1}{10^{n+1}}$

$$= \frac{10^{2n+1-n} \times n!\, 10^{2n+1-(n+1)} \times (n!+1)}{10^{2n+1}}$$

$$= \frac{10^{n+1} \times n! - 10^{2n+1-n-1} \times (n!+1)}{10^{2n+1}}$$

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$$= \frac{10^{n+1} \times n! - 10^{n} \times n! - 10^{n}}{10^{2n+1}} < 0$$

naik

limit

$$\lim_{n \to \infty} \frac{n!}{10^{n}} = +\infty \quad \text{(divergen)}$$