TUGAS KELOMPOK

RESPONSI 3

Kelompok 9:

Reynd Hamonangan Pasaribu	G1401211013
Gladys Adya Zafira	G1401211014
Natasha Muti Hafiza	G1401211019
Fedora Ilahi	G1401211025
Andi Fatihatul Fuadiyah Akbar	G1401211041
Doni Oktavianto	G1401211068
Ignacia Manuela Bregina	G1401211072
Anis Sulistiyowati	G1401211084

1. $a_n = \frac{n}{3n-1}$

→ Kekonvergenan

$a_n = \frac{n}{3n-1}$

$= \lim_{n\to\infty} \frac{n}{3n-1}$

$= \frac{n/n}{3n/n - 1/n}$

$= \frac{1}{3-0} = \frac{1}{3}$ (Konvergen)

→ Kemonotonan

$a_n - a_{n+1} = \frac{n}{3n-1} - \frac{n+1}{3(n+1)-1}$

$= \frac{n}{3n-1} - \frac{n+1}{3n+2}$

$= \frac{n(3n+2) - n+1(3n-1)}{(3n-1)(3n+2)}$

$= \frac{3n^2+2n-(3n^2+3n-n-1)}{9n^2-3n+6n-2}$

$= \frac{1}{9n^2+3n-2} > 0$ TURUN

2. $a_n = \frac{n^3+3n^2+3n}{(n+1)^3}$

→ Kekonvergenan

$a_n = \frac{n^3+3n^2+3n}{(n+1)^3}$

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

$= \frac{1+0+0}{1+0+0+0} = 1$

(konvergen)

→ Kemonotonan

$\frac{n^3+3n^2+3n}{(n+1)^3} - \frac{(n+1)^3+3(n+1)^2+3(n+1)}{(n+1+1)^3}$

$\frac{n^3+3n^2+3n}{(n+1)^3} - \frac{(n+1)^3+3(n+1)^2+3(n+1)}{(n+2)^3}$

$\frac{(n^3+3n^2+3n)(n+2)^3 - [(n+1)^3+3(n+1)^2+3(n+1)](n+2)^3}{(n+1)^3(n+2)^3}$

$\frac{-3n^2-9n-7}{(n^2+3n+2)^3} < 0$ NAIK

• Kemonotonan

$$a_n - a_{n+1} = \frac{n^3+3n^2+3n}{(n+1)^3} - \frac{(n+1)^3+3(n+1)^2+3(n+1)}{((n+1)+1)^3}$$

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

$$= \frac{n^3+3n^2+3n}{(n+1)^3} - \frac{n^3+6n^2+12n+5}{(n+2)^3}$$

$$= \frac{(n^3+3n^2+3n)(n+2)^3-(n^3+6n^2+12n+5)(n+1)^3}{(n+1)^3(n+2)^3}$$

$$= \frac{-3n^2-9n-7}{(n^2+3n+2)^3} < 0 \text{ NAIK}$$

3. $a_n = \dfrac{\cos n\pi}{n}$

• Kekonvergenan

$$-1 \leq \cos n\pi \leq 1$$

$$-\frac{1}{n} \leq \frac{\cos n\pi}{n} \leq \frac{1}{n}$$

$$\left.\begin{array}{l} \cdot \lim\limits_{n\to\infty} -\frac{1}{n} = 0 \\ \cdot \lim\limits_{n\to\infty} \frac{1}{n} = 0 \end{array}\right\} 0 \text{ (konvergen)}$$

• kemonotonan

$$a_n - a_{n+1} = \frac{\cos n\pi}{n} - \frac{\cos(n+1)\pi}{n+1}$$

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

$$= \frac{(n+1)\cos n\pi - n(\cos(n+1)\pi)}{n^2+n}$$

TIDAK TURUN DAN TIDAK NAIK

4. $a_n = e^{-n} \sin n$

-> Kekonvergenan

$a_n = e^{-n} \sin n$

$= \lim_{n\to\infty} e^{-n} \sin n$

$= \lim_{n\to\infty} \frac{\sin n}{e^n}$

$= 0$ (Konvergen)

-> Kemonotonan

$a_n - a_{n+1} = e^{-n} \sin n - (e^{-(n+1)} \sin(n+1))$

$= \frac{\sin n}{e^n} - \frac{\sin(n+1)}{e^{n+1}}$

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

$= \frac{\cancel{e^n}(e \sin n - \sin(n+1))}{\cancel{e^n} \cdot e^{n+1}}$

$= \frac{e \sin n - \sin(n+1)}{e^n \cdot e} > 0$ (TURUN)

5. $a_n = \frac{1}{n^3}$

-> Kekonvergenan

$\lim_{n\to\infty} \frac{1}{n^3} = \frac{1/n^3}{n^3/n^3}$

$= \frac{0}{1}$

$= 0$ (Konvergen)

-> Kemonotonan

$\frac{a_n}{a_{n+1}} = \frac{1/n^3}{1/(n+1)^3}$

$= \frac{(n+1)^3}{n^3}$

$= \frac{n^3+3n^2+3n+1}{n^3}$

$= 1 + \frac{3n^2+3n+1}{n^3} > 1$ TURUN

6. $\frac{1}{2^2}, \frac{1}{2^3}, \frac{1}{2^4}, \ldots$

-> Rumus Eksplisit

$U_n = a \cdot r^{n-1}$

$= \frac{1}{2^2} \cdot \left(\frac{1}{2}\right)^{n-1}$

$= \frac{1}{2^2} \cdot \frac{1}{2^{n-1}}$

$U_n = \frac{1}{2^{2+n-1}}$

$= \frac{1}{2^{n+1}}$

-> Kekonvergenan

$\lim_{n\to\infty} \frac{1}{2^{n+1}} = 0$ (Konvergen)

7. $\sin 1, 2\sin\frac{1}{2}, 3\sin\frac{1}{3}, 4\sin\frac{1}{4}, \ldots$

→ Rumus Eksplisit

$a_n = n\sin\frac{1}{n}$

$n = 1, 2, 3, \ldots$

→ Kekonvergenan

$$\lim_{n\to\infty} n\sin\frac{1}{n} = \lim_{n\to\infty}\frac{\sin 1/n}{1/n} \rightarrow \frac{0}{0}$$

$$\text{L.H} = \lim_{n\to\infty}\frac{\left(-\cos\frac{1}{n}\right)\cdot\frac{1}{n^2}}{-\frac{1}{n^2}} = \lim_{n\to\infty}\cos\left(\frac{1}{n}\right)$$

$$= \cos\left(\frac{1}{\infty}\right)$$

$$= \cos 0^\circ = 1$$

(Konvergen)

8. $0.1, 0.11, 0.111, 0.1111, \ldots$

→ Rumus Eksplisit

$$0.1, 0.11, 0.111, 0.1111, \ldots = \frac{1}{9}(0.9, 0.99, 0.999, 0.999, \ldots)$$

$$= \frac{1}{9}(1-0.1, 1-0.01, 1-0.001, 1-0.0001, \ldots)$$

$$= \frac{1}{9}\left(1-\left(\frac{1}{10}\right)^n\right)$$

→ Kekonvergenan

$$\lim_{n\to\infty}\frac{1}{9}\left(1-\left(\frac{1}{10}\right)^n\right) = \frac{1}{9}\left(1-\frac{1}{10^\infty}\right)$$

$$= \frac{1}{9}\left(1-\frac{1}{\infty}\right)$$

$$= \frac{1}{9}(1-0)$$

$$= \frac{1}{9} \text{ (Konvergen)}$$