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The image shows a handwritten mathematical derivation on lined paper. The derivation starts with the series $\sum_{n=1}^{\infty} \frac{3n+1}{n^2-4}$. It then shows the inequality $\frac{3n}{n^2} < \frac{3n+1}{n^2-4}$, which simplifies to $\frac{3}{n} \leq \frac{3n+1}{n^2-4}$. This leads to the conclusion that $\sum \frac{3}{n} = 3 \left[\sum \frac{1}{n} \right] \rightarrow$ harmonik $=$ divergen. The text "UJI BANDING" is written in the upper right corner of the paper. There are also fields for "No. :" and "Date :".

$$\sum_{n=1}^{\infty} \frac{3n+1}{n^2-4} \rightarrow \frac{3n}{n^2} < \frac{3n+1}{n^2-4}$$
$$\frac{3}{n} \leq \frac{3n+1}{n^2-4}$$
$$\hookrightarrow \sum \frac{3}{n} = 3 \left[\sum \frac{1}{n} \right] \rightarrow \text{harmonik} = \text{divergen}$$

UJI BANDING

No. :
Date :

$$2. \sum_{n=1}^{\infty} \rightarrow \text{uji Bading Limit}$$

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

$$\textcircled{2} b_n = n^{p-q}$$

$$= n^{1-2}$$

$$= \frac{1}{n} \text{ (deret harmonik)}$$

(divergen)

$$\textcircled{3} S = \lim_{n \rightarrow \infty} \frac{a_n}{b_n}$$

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

$$= 1 \quad (0 < L < \infty)$$

$\textcircled{4}$ Dapat disimpulkan bahwa kedua persamaan bersama divergen

$$3. \sum_{n=1}^{\infty} \frac{n!}{n^{100}}$$

dengan uji hasil bagi

$$a_n = \frac{n!}{n^{100}} \quad a_{n+1} = \frac{(n+1)!}{(n+1)^{100}}$$

$$c = \lim_{n \rightarrow \infty} \frac{a_{n+1}}{a_n}$$

$$= \lim_{n \rightarrow \infty} \frac{(n+1)!}{(n+1)^{100}} \cdot \frac{n^{100}}{n!}$$

$$= \lim_{n \rightarrow \infty} (n+1) \cdot \frac{n^{100}}{(n+1)^{100}}$$

$$= \lim_{n \rightarrow \infty} (n+1) \cdot \left(\frac{n}{n+1} \right)^{100}$$

$$= \infty \cdot \lim_{n \rightarrow \infty} \left(\frac{n}{n+1} \right)^{100}$$

$$= \infty \cdot 1$$

$$= +\infty > 1$$

$c > 1$
divergen

\therefore menurut UHB

$$\sum_{n=1}^{\infty} \frac{n!}{n^{100}} \text{ divergen}$$

$$\begin{aligned}
 4. \quad & \sum_{k=1}^{\infty} \frac{3^k + k}{k!} \rightarrow a_k = \frac{3^k + k}{k!} \\
 & \rightarrow \text{Uji Hasil Bagi} \\
 & \Rightarrow \lim_{k \rightarrow \infty} \frac{a_{k+1}}{a_k} = \rho \\
 & \Rightarrow \rho = \lim_{k \rightarrow \infty} \frac{3^{k+1} + k+1}{(k+1)!} \cdot \frac{k!}{3^k + k} \\
 & = \lim_{k \rightarrow \infty} \frac{3^{k+1} + k+1}{(k+1)(3^k + k)} = \lim_{k \rightarrow \infty} \frac{3}{k+1} - \frac{2}{3^k + k} + \frac{3}{(k+1)(3^k + k)} \\
 & = 0 \rightarrow \text{konvergen} \\
 & \Rightarrow \text{maka } \sum_{k=1}^{\infty} \frac{3^k + k}{k!} \text{ konvergen ke } 0 \text{ menurut uji hasil bagi}
 \end{aligned}$$

$$\begin{aligned}
 5) \quad & \sum_{n=1}^{\infty} \frac{3n+1}{n^2-4} \\
 & \text{uji banding limit} \\
 a_n &= \frac{3n+1}{n^2-4} \quad \lim_{n \rightarrow \infty} \frac{a_n}{b_n} : \lim_{n \rightarrow \infty} \frac{3n+1}{n^2-4} \cdot \frac{n}{3} \\
 b_n &= \frac{3n}{n^2} = \frac{3}{n} \quad = \lim_{n \rightarrow \infty} \frac{3n^2 + n}{3n^2 - 12} : 1 \\
 & \downarrow \\
 & \text{deret harmonik, divergen}
 \end{aligned}$$

$$\begin{aligned}
 6) \quad & \sum_{n=1}^{\infty} \left(\frac{n}{3n+2} \right)^n \\
 & \text{untuk } n \neq 1 \text{ maka } a_n = \left(\frac{n}{3n+2} \right)^n \text{ positif} \\
 \lim_{n \rightarrow \infty} (a_n)^{1/n} &= \lim_{n \rightarrow \infty} \left(\left(\frac{n}{3n+2} \right)^n \right)^{\frac{1}{n}} = \lim_{n \rightarrow \infty} \frac{n}{3n+2} = \frac{1}{3} < 1 \\
 & \therefore \text{Menurut Teorema Uji Akar, deret } \sum_{n=1}^{\infty} \left(\frac{n}{3n+2} \right)^n \text{ konvergen} \parallel
 \end{aligned}$$

$$7.] \sum_{n=2}^{\infty} \left(\frac{1}{2nn}\right)^n$$

Uji akar

untuk $n \geq 2$ maka $a_n = \left(\frac{1}{2nn}\right)^n$ positif.

$$\text{Karena } \lim_{n \rightarrow \infty} (a_n)^{1/n} = \lim_{n \rightarrow \infty} \left(\left(\frac{1}{2nn}\right)^n\right)^{1/n}$$

$$= \lim_{n \rightarrow \infty} \frac{1}{2nn} = 0 < 1$$

Maka menurut uji akar deret $\sum_{n=2}^{\infty} \left(\frac{1}{2nn}\right)^n$ konvergen //

$$a_{n+1} < a_n$$

$$\frac{n+1}{n+2} < \frac{n}{n+1}$$

$$n^2 + 2n + 1 < n^2 + 2n \quad (\text{salah})$$

• Cari nilai limitnya:

$$\lim_{n \rightarrow \infty} a_n = \lim_{n \rightarrow \infty} \frac{n}{n+1} = 1 \neq 0$$

$\sum u_n$ divergen menurut uji ganti tanda

uji kedivergenan pada $\sum |u_n|$

$$\lim_{n \rightarrow \infty} |u_n|$$

$$\lim_{n \rightarrow \infty} \left| (-1)^{n+1} \frac{n}{n+1} \right|$$

$$\lim_{n \rightarrow \infty} \frac{n}{n+1}$$

$$= 1 \neq 0$$

$\sum |u_n|$ divergen menurut uji kedivergenan

Karena $\sum |u_n|$ divergen dan $\sum u_n$ divergen, maka

$$\sum_{n=1}^{\infty} (-1)^{n+1} \cdot \frac{n}{n+1} \text{ divergen}$$

KOALA

9. $\sum_{n=1}^{\infty} \sin \frac{n!}{n^2}$

Jawab:

$U_n = \sin \frac{n!}{n^2} \rightarrow$ berfluktuasi diantara $(-1,1)$, sehingga divergen

$|U_n| = \left| \sin \left(\frac{n!}{n^2} \right) \right| \rightarrow$ berfluktuasi diantara $(0,1)$ sehingga divergen

Karena U_n dan $|U_n|$ divergen, maka $\sum_{n=1}^{\infty} \sin \frac{n!}{n^2}$ divergen

10. $\sum_{n=1}^{\infty} \left(-\frac{4}{3} \right)^n = \sum_{n=1}^{\infty} (-1)^n \left(\frac{4}{3} \right)^n \rightarrow a_n = \left(\frac{4}{3} \right)^n$

\Rightarrow Uji Banding Muatlab

$\Rightarrow \lim_{n \rightarrow \infty} \frac{|a_{n+1}|}{|a_n|} = p$

$\Rightarrow p = \lim_{n \rightarrow \infty} \left(\frac{4}{3} \right)^{n+1} \cdot \left(\frac{3}{4} \right)^n$

$= \lim_{n \rightarrow \infty} \left(\frac{4}{3} \right)^n \cdot \frac{4}{3} \cdot \left(\frac{3}{4} \right)^n = \lim_{n \rightarrow \infty} (1)^n \cdot \frac{4}{3}$

$= \frac{4}{3} > 1 \rightarrow$ divergen

\Rightarrow maka $\sum_{n=1}^{\infty} \left(-\frac{4}{3} \right)^n$ adalah divergen