✳ Summary of tests:-

- $\{a_n\}$ ((sequence))

→ If $\lim\limits_{n\to\infty} a_n = C$ ((any finite number)) then $\{a_n\}$ converges to C

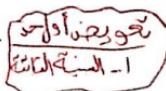→ If $\lim\limits_{n\to\infty} a_n$ $\begin{cases} \to \mp\infty \\ \to DNE \end{cases}$ the $\{a_n\}$ diverges.

- $\sum a_n$ ((series)).

① p-series : $\sum \dfrac{1}{n^p}$

→ if $P > 1$ converges, if $P \leqslant 1$ diverges.

② Geometric series: $\sum\limits_{n=0}^{\infty} a\, r^n = a + ar + ar^2 + \cdots$

→ if $|r| < 1$, converges to $\dfrac{a}{1-r}$ — الجواب الأول

if $|r| \leqslant 1$, diverges. يكتب السؤال

③ The nth term test:

→ if $\lim\limits_{n\to\infty} a_n \neq 0$ then $\sum a_n$ diverges.

if $\lim\limits_{n\to\infty} a_n = 0$ ((test fails)).

④ The nth partial sum: تستخدم في telescoping series.

→ If $\lim S_n = L$ then $\sum a_n$ converges.

$S_n = a_1 + a_2 + \cdots + a_n$ مجموع الحدود جميعها

if $\lim\limits_{n \to \infty} S_n \begin{cases} \to \mp\infty \\ \to DNE \end{cases}$, $\sum a_n$ diverges.

④ Series with nonnegative terms:

→ Comparison test «D.C.T.»
→ Limit comparison test «L.C.T»
→ Integral test «+ve, cont., decreasing».
→ Ratio test.
→ n-th root test.

⑤ Alternating series test: $\sum (-1)^{n+1} U_n$

→ U_n +ve, decreasing, $\lim U_n = 0 \to \sum (-1)^{n+1} U_n$ converges by alternating series test.
→ If $\lim U_n \neq 0 \to$ diverges by n-th term test.