Examples: Evaluate $\lim_{n\to\infty}\left(1+\frac{i}{n}\right)$

Sol: $z_n = 1+\frac{i}{n}$, $x_n = 1$ & $y_n = \frac{1}{n}$

$\Rightarrow \lim_{n\to\infty} x_n = 1$ & $\lim_{n\to\infty} y_n = \lim_{n\to\infty}\frac{1}{n} = 0$

$\therefore \lim_{n\to\infty} z_n = 1+i\,0 = 1$.

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Series

التاريخ / /

Def: ① An infinite series of complex number is an infinite sum

$$\sum_{n=1}^{\infty} z_n = z_1 + z_2 + \cdots$$

② If the seq. $S_N = \sum_{n=1}^{N} z_n, N = 1, 2, \ldots$ of partial sums converges to S then we say that the series of complex numbers $\sum_{n=1}^{\infty} z_n$ converges to S, then we say that the series of complex numbers $\sum_{n=1}^{N} z_n$ converges to S, and we write $\sum_{n=1}^{\infty} z_n = S$.

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③ If a series of complex numbers does not converge, then we say that it diverges.

ملاحظة: السلسلة سميناها متباعدة اذا كانت
من العدود تسمى Series.
Converge هنا المجموع اي كان له نهاية تكون
diverge واذا كان لا يوجد له نهاية تكون

$$S_1 = Z_1$$

$$S_2 = Z_1 + Z_2$$

$$S_3 = Z_1 + Z_2 + Z_3$$

$$\vdots$$

$$\lim_{N \to \infty} S_N = Z_1 + Z_2 + \cdots + Z_N = \sum_{n=1}^{\infty} Z_n$$

← دراسة هذه السلسلة تعود الى دراسة النهاية

$$\lim_{N \to \infty} S_N$$

Theorem: Let $z_n = x_n + i y_n$ and $s = x + iY$ then $\sum_{n=1}^{\infty} z_n = s = x + iY$

If and only if $\sum_{n=1}^{\infty} x_n = x$ & $\sum_{n=1}^{\infty} y_n = Y$

$$s_N = \sum_{n=1}^{N} z_n = \sum_{n=1}^{N} x_n + i \sum_{n=1}^{N} y_n$$

$$\Downarrow$$

$$s_N = x_N + i Y_N$$