Sequence

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Sequence: A sequence $S = \{S_n\}_{n=1}^{\infty}$ of real number is a function from N (the set of positive integer into R (the set of real number) where

S_n denotes the n^{th} term of sequence

Example: $\{2^n\}_{n=1}^{\infty}$

Here

$\Rightarrow S_n = 2^n$

and the sequence will be if we put $n = 1, 2, 3, 4 \ldots$

$2, 2^2, 2^3, 2^4, 2^5, \ldots 2^n, \ldots \infty$

Convergent sequence: If the sequence of real number $\{S_n\}_{n=1}^{\infty}$ has the limit L, then we say that,

$\boxed{\{S_n\}_{n=1}^{\infty} \text{ is Convergent to } L}$

ie, $\rightarrow \boxed{\lim_{n \to \infty} S_n = L} \Rightarrow$ finite

$\Rightarrow$ we say S_n Convergent to L

Example: If $S_n = \dfrac{2n}{n+1}$

then $\Rightarrow \lim_{n \to \infty} \dfrac{2n}{n+1} = \lim_{n \to \infty} \dfrac{\cancel{n} \cdot 2}{\cancel{n}(1 + \frac{1}{n})}$

$\Rightarrow = \lim_{n \to \infty} \dfrac{2}{(1 + \frac{1}{n})} = \dfrac{2}{1 + \frac{1}{\infty}}$

$= 2 \quad \because \frac{1}{\infty} = 0$

$\Rightarrow$ given sequence S_n is convergent to 2

Convergent के लिए ($\lim_{n\to\infty} S_n$ find करना है) अगर finite Ans आये तो Convergent होगा otherwise divergent बोलेंगे।

Assignment –

Q.1 Show that the sequence $\{S_n\}_{n=1}^{\infty}$, where

$$S_n = \frac{1}{n+1}$$ Converges to 0

Q.2. Show that the sequence $\{S_n\}_{n=1}^{\infty}$ defined by $S_n = \sqrt{n+1} - \sqrt{n}$, Converges to 0

Q.3. Show that $\lim_{n\to\infty} \frac{3n^2 - 6n}{5n^2+4} = \frac{3}{5}$

Q.4. Show that the sequence $\left\{\frac{3n-1}{n^2+2} \cdot \frac{n^4-n}{n^3+1}\right\}$ Converges to 3

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Note. if $\lim_{n\to\infty} = \infty \Rightarrow$ divergent to ∞

Note $= -\infty$ divergent to $-\infty$

Divergent Sequence

A sequence which is not convergent is said to be divergent.

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