Gajendra Purohit

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SEQUENCE OF REAL NUMBER

Some important theorem on Limit :

(1) If $\lim_{n\to\infty} a_n = l$ then $\lim_{n\to\infty} |a_n| = |l|$ But converse may not true

(2) **Cauchy's First Theorem :** Let $< a_n >$ be a sequence of real numbers

and $\lim_{n\to\infty} a_n = l$ then $\lim_{n\to\infty} \frac{a_1 + a_2 + \ldots\ldots + a_n}{n} = l$

Q1. Find the Limit of $\dfrac{1+\sqrt{2}+\sqrt[3]{3}.....+\sqrt[n]{n}}{n}$ **CSIR NET 2022**

Note : The converse of this theorem may not be true

(2) Cauchy's Second theorem : Let $\langle a_n \rangle$ be a sequence of real number and $\lim_{n\to\infty} a_n = l$ Then $\lim_{n\to\infty} (a_1.a_2.....a_n)^{\frac{1}{n}} = l$

Q2. Find the limit of $\left[(1)(2)^{\frac{1}{2}}(3)^{\frac{1}{3}}.....(n)^{\frac{1}{n}}\right]^{\frac{1}{n}}$

(3) Let $< a_n >$ be sequence of real number and $a_n > 0$; $\forall\ n \in N$

Then $\underset{n\to\infty}{Lim} \frac{a_{n+1}}{a_n} \Rightarrow \lim_{n\to\infty} (a_n)^{\frac{1}{n}} = l \quad ; \ l > 0$

NOTE :The converse of this theorem is not true

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Q3 . $\lim_{n\to\infty} \frac{(n!)^{\frac{1}{n}}}{n}$ Which of following is true

(a) e

(b) 1/e

(c) e^2

(d) $1/e^2$

Q4 . $L = \lim_{n\to\infty} \frac{1}{\sqrt[n]{n!}}$ Then which of the following is true

(a) $L = 0$ (b) $L = 1$

(b) $0 < L < \infty$ (d) $L = \infty$

CSIR NET JUNE 2017

Q5 . $L = \lim_{n\to\infty}\left\{\frac{(3n)!}{(n!)^3}\right\}^{\frac{1}{n}}$ Then which of the following is true

(a) L = 0

(b) L = 27

(b) L = 3

(d) L = 30

(4) Let <a_n> be a sequence of real number such that

$$\lim_{n\to\infty}\frac{a_{n+1}}{a_n}=l \quad \text{Where} |l|<1 \text{ then } \lim_{n\to\infty} a_n = 0$$

(5) Let <a_n>be a sequence of real number such that

$$\lim_{n\to\infty}\frac{a_{n+1}}{a_n}=l \quad \text{Where} |l|>1 \text{ Then } \lim_{n\to\infty} a_n = \infty$$

Q7 : $\lim_{n\to\infty} \frac{1}{\sqrt{n}}\left[\frac{1}{\sqrt{1}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{5}}+\ldots.\frac{1}{\sqrt{2n-1}+\sqrt{2n+1}}\right]$

equals **CSIR NET JUNE 2014**

(a) $\sqrt{2}$

(b) $\frac{1}{\sqrt{2}}$

(c) $\sqrt{2}+1$

(d) $\frac{1}{\sqrt{2}+1}$

Q8 : $\lim_{n\to\infty} \frac{1}{\sqrt{n}}\left[\frac{1}{\sqrt{2}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{6}}+\ldots\ldots\frac{1}{\sqrt{2n}+\sqrt{2n+2}}\right]$

CSIR NET DEC 2015

(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$

(c) $\sqrt{2}+1$ (d) $\frac{1}{\sqrt{2}+1}$

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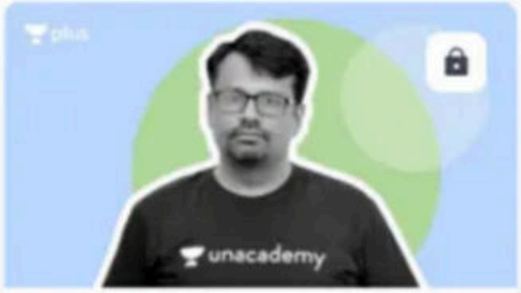

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Educator highlights

- Works at **Pacific Science College**
- Studied at **M.Sc., NET, PhD(Algebra), MBA(Finance), BEd**
- PhD, NET | Plus Educator For CSIR NET | Youtuber (260K+Subs.) | Director Pacific Science College |
- Lives in **Udaipur, Rajasthan, India**
- Unacademy Educator since

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