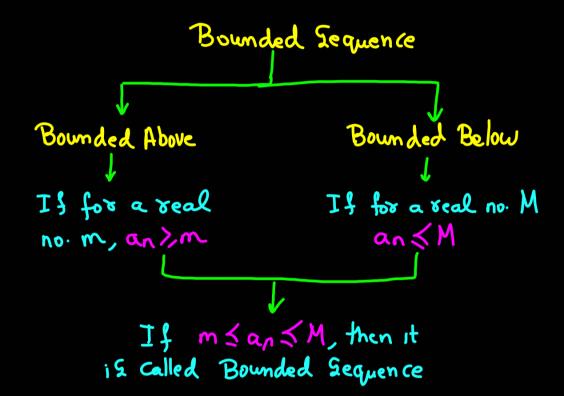
$$\langle a_n \rangle = \frac{1}{2^n} \Rightarrow \langle a_n \rangle = \left\{ \frac{1}{2^n}, \frac{1}{2^n}, \frac{1}{2^n}, \dots, \frac{1}{2^n} \right\}$$

#### # Bounded Sequences:



Lim un= l un > nth term of sequence

# Monotonic Sequences:

- i) If antiban > Monotonically ping Sequence 4 antiban > Strictly ping
- 9) If antisan > Monotonically ling sequence bantisan > Strictly ling

# Properties of Monotonic segn :-

- 1) Monotonic Ting segn & Bounded above > Govergent
- 2) Monotonic Ling Sean & Bounded below > Diveogent
- 3 Monotonic 7ing Seque > Not bounded above > Diverges to +00
- 4 Montonic Jing Seq" > Not bounded below > Diverges to -00

# To Remember:

- 1) Lim (n) = 1
- $2 \lim_{n \to \infty} \left( \frac{1+1}{n} \right)^n = e$

Sum of terms of Sequences, i.e., u, +u, +u, +u, +u, oo Denoted by  $\sum_{n=0}^{\infty}$  un

If 
$$\sum_{n=1}^{\infty} u_n = u_1 + u_2 + u_3 + \dots + u_n + \dots = 0$$

$$S_1 = u_1$$
 $S_2 = u_1 + u_2$ 
 $S_n = u_1 + u_2 + u_3 + \dots + u_n$ 
 $Partial$ 
 $S_n = u_1 + u_2 + u_3 + \dots + u_n$ 

### # God for Govergence of Series:

# Types of Scries:

Sevies

the team

Alternating Series

# Tests for the term geries

#P-geries Test:

If 
$$\sum_{n=1}^{\infty} u_n = \frac{1}{n^p}$$
 be a +ve term series, then:

# Comparision Test:-

Let Sun & Sun be 2 positive terms geries &

There exists Smaller Bigger

- 1) In Converges > I un Converges
- 2) Sun diverges > Sun diverges

# Limit Compasizion Test:

Let  $\Sigma$  un and  $\Sigma$   $V_n$  be two tre team series such that  $\lim_{n\to\infty} u_n = 1$ , where l is non-zero finite number l

then Sun & Sun are convergent or divergent together

## AMethod of finding Vn

then we take 
$$= \frac{q}{n^{b-q}}$$
 i.e  $v_n = \frac{\text{Highest bower of } N^{v}}{\text{Highest bower of } D^{v}}$ 

Not Considering constant of both  $N^{v} \in D^{v}$ 

#### H d'Alembert Ratio Test

Let Dun be a tre term series

- 1) If lim until <1 > Sevies ig Convergent
- 2) If lim unt >1 > Series is divergent
- 3) If  $\lim_{n\to\infty} \frac{u_{n+1}}{u_n} = 1 \to \text{Test fails}$

Apply this when series has n! (00) n (n+1) type

# Raabe's Test:

Let un be a tre term geries then

Apply when D'Alembert Ratio test fails & power of un is 1

# Cauchy's Root Test: Apply when power has n in it

The Series Dun of the terms is

# Cauchy's Integral Test:

If for x >, 1, f be a non-negative monotonic

decreasing integrable f" + f(r)=un Yn EN then

 $\sum_{n=1}^{\infty} u_n \text{ and } \int_{0}^{\infty} f(z) dz \text{ either both converge or diverge}$ 

1)  $\sum_{n=1}^{\infty}$  un is convexgent iff  $\lim_{x\to\infty} \int_{1}^{x} f(x) dx$  finitely exists

2) \sum\_{n=1}^{\infty} un is divergent iff \lim \( \infty \) \( \frac{1}{2} \) \dx does not finitely exist \( \text{x>0} \)

# Tests for Alternating Series

# Leibnitz Test:

Let Lun? be a sequence such that

a) un>0; b) un+1 \ (un; c) Lim un=0

Then the alternating series  $\sum_{n=1}^{60} (-1)^{n-1}$  un is convergent

# Absolute Convergence:

Alternating series is said to be Absolutely Converging iff [(1) un is convergent

H Conditional Convergence:

An alternating series is said to be Conditionally converging if \sum un is convergent but not Absolutely Convergent