# Mathematics 1 - Sequence and Series 

Topics: Computer engineering

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## 1. Sequences:

- A sequence is an ordered list of numbers called terms. The terms follow a specific pattern or rule.
- Sequences can be finite (having a limited number of terms) or infinite (continuing indefinitely).


## 2. Arithmetic Sequence:

- In an arithmetic sequence, each term is found by adding or subtracting a common difference (d) to the previous term.
- The nth term of an arithmetic sequence can be represented as: $a_{n}=a_{1}+(n-1) d$, where $\mathrm{a}_{1}$ is the first term.


## 3. Geometric Sequence:

- In a geometric sequence, each term is found by multiplying or dividing the previous term by a common ratio ( $r$ ).
- The nth term of a geometric sequence can be represented as: $a_{n}=a_{1} \times r^{\wedge}(n-1)$, where $a_{1}$ is the first term.


## 4. Series:

- A series is the sum of the terms of a sequence. It can be finite or infinite.
- The sum of the first n terms of a sequence is called an n -th partial sum.


## 5. Arithmetic Series:

- An arithmetic series is the sum of the terms of an arithmetic sequence.
- The sum of the first $n$ terms of an arithmetic series $\left(\mathrm{S}_{\mathrm{n}}\right)$ can be calculated using the formula: $S_{n}=n / 2\left(a_{1}+a_{n}\right)$.


## 6. Geometric Series:

- A geometric series is the sum of the terms of a geometric sequence.
- The sum of the first $n$ terms of a geometric series ( $\mathrm{S}_{\mathrm{n}}$ ) can be calculated using the formula: $S_{n}=a_{1}\left(1-r^{n}\right) /(1-r)$, where $r$ is the common ratio.


## 7. Convergence and Divergence:

- A series converges if the sum of its terms approaches a finite value as the number of terms increases.
- A series diverges if the sum of its terms does not approach a finite value as the number of terms increases.
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