10.2 Infinite Series

Main Ideas

- A **Infinite Series** is the sum of an infinite <u>sequence</u>

$$S_n \;=\; \sum_{n=1}^{\infty} a_n \;=\; a_1 + a_2 + a_3 + ...$$

- A **Partial Sum** is the sum of the first n terms of a series

$$s_n \;=\; \sum_{k=1}^{n} a_k \;=\; a_1 + a_2 + a_3 + ... + a_n$$

if the sequence of partial sums $\{\, s_n \,\}$ converges to L as $n \to \infty$, then we say the infinite series converges to L

- The N**-th term test**

$$\text{if} \quad \lim_{n \to \infty} a_n \neq 0 \quad \text{then the series} \quad \sum_{n=1}^{\infty} a_n \quad \text{diverges}$$

(otherwise the test is <u>inconclusive</u>)

- **Geometric Series**

are series in the form $\quad \displaystyle\sum_{n=1}^{\infty} ar^{n-1} = a + ar + ar^2 + ar^3 + ...$

the partial sum of the series is $\quad s_n \;=\; a + ar + ar^2 + ... + ar^{n-1} \;=\; \dfrac{a(1 - r^n)}{1 - r}$

if $\quad |r| < 1 \quad$ then the series <u>converges</u> to $\quad \dfrac{a}{1 - r} \quad$ otherwise it <u>diverges</u>