- The Squeeze Theorem
  If $a_n \le b_n \le c_n$ for $n \ge n_0$ and $\lim_{n\to\infty} a_n = \lim_{n\to\infty} c_n = L$, then $\lim_{n\to\infty} b_n = L$.
- $\boxed{\text{If } \lim_{n\to\infty} |a_n| = 0, \text{ then } \lim_{n\to\infty} a_n = 0.}$
- r^n is convergent if $-1 < r \le 1$ and divergent for all other values of r.

$$\boxed{\lim_{n\to\infty} = \begin{cases} 0 & \text{if } -1 < r < 1 \\ 1 & \text{if } r = 1 \end{cases}}$$

- A sequence $\{a_n\}$ is increasing if $a_n \le a_{n+1}$ for all $n \ge 1$. $a_1 \le a_2 \le a_3 \le \ldots$
  A sequence $\{a_n\}$ is decreasing if $a_n \ge a_{n+1}$ for all $n \ge 1$.
  A sequence that is either increasing or decreasing is monotonic.
- A sequence $\{a_n\}$ is bounded above if there is a number M such that $a_n \le M$ for all $n \ge 1$
  A sequence $\{a_n\}$ is bounded below if there is a number m such that $M \le a_n$ for all $n \ge 1$
  If $\{a_n\}$ is bounded above and below, it is called a bounded sequence.
- Every bounded monotonic sequence is convergent.

SECTION 11.2 SERIES

- Given a series $\sum_{n=1}^{\infty} a_n = a_1 + a_2 + a_3 + \ldots$, let s_n denote its n^{th} partial sum
  $\boxed{s_n = \sum_{i=1}^{n} a_i = a_1 + a_2 + \ldots + a_n}$ If the sequence $\{s_n\}$ is convergent and $\lim_{n\to\infty} s_n = s$ exists,
  then the series is convergent and $\boxed{\sum_{n=1}^{\infty} a_n = s.}$ s is the series sum. Otherwise, it is divergent

- The geometric series $\boxed{\sum_{n=1}^{\infty} ar^{n-1}}$ is an example of an infinite series.
  It is convergent if $\boxed{|r| < 1}$ Its sum $s = \frac{a}{1-r}$ $|r| < 1$. If $|r| \ge 1$, the series is divergent
- The harmonic series is $\sum_{n=1}^{\infty} \frac{1}{n}$. It is divergent.
- If $\sum_{n=1}^{\infty} a_n$ is convergent, then $\lim_{n\to\infty} a_n = 0$.
- If $\lim_{n\to\infty} a_n$ does not exist or if $\lim_{n\to\infty} a_n \ne 0$, then the series is divergent.
- If $\sum a_n$ and $\sum b_n$ are convergent, then $\sum ca_n$, $\sum(a_n + b_n)$, $\sum(a_n - b_n)$ are as well
  (i) $\sum_{n=1}^{\infty} ca_n = c\sum_{n=1}^{\infty} a_n$, where c is a constant.
  (ii) $\sum_{n=1}^{\infty} (a_n + b_n) = \sum_{n=1}^{\infty} a_n + \sum_{n=1}^{\infty} b_n$ (iii) $\sum_{n=1}^{\infty} (a_n - b_n) = \sum_{n=1}^{\infty} a_n - \sum_{n=1}^{\infty} b_n$