Basic Properties of Convergent Sequences (Limit Laws)

Let $\lim_{n\to\infty} a_n = A$ and $\lim_{n\to\infty} b_n = B$.

Then $\lim_{n\to\infty}(a_n + b_n) = A + B$ (sum law)

$\lim_{n\to\infty}(a_n b_n) = AB$ (product law)

$\lim_{n\to\infty}\left(\frac{a_n}{b_n}\right) = \frac{A}{B}$ if $B \neq 0$ (quotient law)

Examples: $\lim_{n\to\infty} \frac{3n^3 - 2n + 5}{4n^3 + 6n^2 + 1}$

L'Hospital's Rule for $\lim_{x\to\infty} \frac{f(x)}{g(x)}$

If either $\lim_{x\to\infty} f(x) = \infty$ and $\lim_{x\to\infty} g(x) = \infty$ or

$\lim_{x\to\infty} f(x) = 0$ and $\lim_{x\to\infty} g(x) = 0$ and

$\lim_{x\to\infty} \frac{f'(x)}{g'(x)} = L$, then $\lim_{x\to\infty} \frac{f(x)}{g(x)} = L$.