Sequences and Series
Selected Examples

	Sequence $\{ a_n \}$	Series $\sum_{n=1}^{+\infty} a_n$
$a_n = \frac{1}{2^n}$	$\left\{\frac{1}{2^n}\right\}$ converges to 0. $\lim_{n\to+\infty} \frac{1}{2^n} = 0$	$\sum_{n=1}^{+\infty} \frac{1}{2^n} = 1 =$ sum convergent, geometric
$a_n = \left(\frac{-1}{3}\right)^n$	$\left\{\left(\frac{-1}{3}\right)^n\right\}$ converges to 0. $\lim_{n\to+\infty} \left(\frac{-1}{3}\right)^n = 0$	$\sum_{n=1}^{+\infty} \left(\frac{-1}{3}\right)^n = \frac{-1}{4} =$ sum convergent, geometric
$a_n = \frac{1}{n}$	$\left\{\frac{1}{n}\right\}$ converges to 0 $\lim_{n\to+\infty} \frac{1}{n} = 0$	$\sum_{n=1}^{+\infty} \frac{1}{n} = +\infty$ (no sum) divergent, harmonic
$a_n = \frac{n}{n+1}$	$\left\{\frac{n}{n+1}\right\}$ converges to 1 $\lim_{n\to+\infty} \frac{n}{n+1} = 1$	$\sum_{n=1}^{+\infty} \frac{n}{n+1} = +\infty$ (no sum) divergent
$a_n = (-1)^{n+1}$	$\{(-1)^{n+1}\}$ diverges $\lim_{n\to+\infty} (-1)^{n+1}$ DNE	$\sum_{n=1}^{+\infty} (-1)^{n+1}$ DNE (no sum) divergent
$a_n = \frac{(-1)^{n+1}}{n}$	$\left\{\frac{(-1)^{n+1}}{n}\right\}$ converges to 0. $\lim_{n\to+\infty} \frac{(-1)^{n+1}}{n} = 0$	$\sum_{n=1}^{+\infty} \frac{(-1)^{n+1}}{n} = \ln 2 \approx 0.693 =$ sum convergent, alternating
$a_n = \frac{1}{n^2}$	$\left\{\frac{1}{n^2}\right\}$ converges to 0 $\lim_{n\to+\infty} \frac{1}{n^2} = 0$	$\sum_{n=1}^{+\infty} \frac{1}{n^2} = \frac{\pi^2}{6} \approx 1.645$ convergent, p series
$a_n = \frac{1}{\ln(n+1)}$	$\left\{\frac{1}{\ln(n+1)}\right\}$ converges to 0 $\lim_{n\to+\infty} \frac{1}{\ln(n+1)} = 0$	$\sum_{n=1}^{+\infty} \frac{1}{\ln(n+1)} = +\infty$ (no sum) divergent
$a_n = \frac{1}{T_n}$ $T_n = \frac{n(n+1)}{2}$	$\left\{\frac{1}{T_n}\right\}$ converges to 0 $\lim_{n\to+\infty} \frac{1}{T_n} = 0$	$\sum_{n=1}^{+\infty} \frac{1}{T_n} = 2 =$ sum convergent