Rules for dealing with summation and product notation

$\left(\sum_{j=m}^{n} a_j\right)+\left(\sum_{j=m}^{n} b_j\right)=\left(\sum_{j=m}^{n}\left(a_j+b_j\right)\right)$	$\left(\prod_{j=m}^{n} a_j\right)\cdot\left(\prod_{j=m}^{n} b_j\right)=\prod_{j=m}^{n}\left(a_j\cdot b_j\right)$
$\sum_{j=m}^{n}\lambda a_j=\lambda\sum_{j=m}^{n} a_j$	$\prod_{j=m}^{n}\left(a_j{}^{\lambda}\right)=\left(\prod_{j=m}^{n} a_j\right)^{\lambda}$
$\prod_{j=m}^{n}\left(a^{b_j}\right)=a^{\left(\sum_{j=m}^{n} b_j\right)}$	

Three important series:

- Arithmetic Series:

$$\sum_{j=0}^{n} j=\frac{n(n+1)}{2}$$

- Geometric Series:

$$\sum_{j=0}^{n} a^j=\frac{1-a^{n+1}}{1-a}=\frac{a^{n+1}-1}{a-1}$$

Moreover,

$$\sum_{j=0}^{\infty} a^j=\frac{1}{1-a},\ \textit{for}\ |a|<1$$

- Harmonic Series:

$$\sum_{j=1}^{n}\frac{1}{j}\approx\gamma+\ln(n)$$

where $\gamma=0.5772156649\ldots$ is Euler's constant.