

Geometric Series Formulas

$$\sum_{k=0}^{\infty} a^k = \frac{1}{1-a} \quad |a| < 1$$

$$\sum_{k=0}^N a^k = \frac{1-a^{N+1}}{1-a}$$

$$\sum_{k=1}^{\infty} a^k = \frac{a}{1-a} \quad |a| < 1$$

$$\sum_{k=1}^N a^k = \frac{a(1-a^{N+1})}{1-a}$$

$$\sum_{k=N_1}^{N_2} a^k = \frac{a^{N_1} - a^{N_2+1}}{1-a}$$

$$\sum_{k=1}^N k = \frac{N(N+1)}{2}$$

Changing Subject of Summation

$$X(z) = \sum_{n=-\infty}^{-1} -a^n z^{-n} = -\sum_{m=1}^{\infty} a^{-m} z^m = -\sum_{m=1}^{\infty} (a^{-1}z)^m$$