## **Geometric Series Formulas**

$$egin{align} \sum_{k=0}^{\infty} a^k &= rac{1}{1-a} & |a| < 1 \ \sum_{k=0}^{N} a^k &= rac{1-a^{N+1}}{1-a} & |a| < 1 \ \sum_{k=1}^{\infty} a^k &= rac{a}{1-a} & |a| < 1 \ \sum_{k=1}^{N} a^k &= rac{a(1-a^{N+1})}{1-a} & \ \sum_{k=N_1}^{N_2} a^k &= rac{a^{N_1}-a^{N_2+1}}{1-a} & \ \sum_{k=N_1}^{N} k &= rac{N(N+1)}{2} & \ \end{array}$$

## **Changing Subject of Summation**

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