Sequences and Sums - Closed Form

Arithmetic Sequence

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

Sum of Squares

$$\sum_{k=0}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$$

Sum of Cubes

$$\sum_{k=0}^{n} k^3 = \frac{n^2(n+1)^2}{4}$$

Geometric Sequence

$$\sum_{k=0}^{n} x^k = \frac{x^{n+1}-1}{x-1}$$

Harmonic Sequence

$$\sum_{k=0}^{n} \frac{1}{k} = \ln n$$