$$\sum_{i=1}^{n-1} i = n\frac{(n-1)}{2} \qquad \sum_{i=0}^{n} x^i = \frac{x^{n+1}-1}{x-1}$$

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