

- Let us consider the definition

$$S_n = \sum_{i=0}^n g(i),$$

where $g(\cdot)$ is any function.

- Then we have

$$S_{n+1} = g(0) + g(1) + g(2) + \cdots + g(n-1) + g(n) + g(n+1),$$

$$S_n = g(0) + g(1) + g(2) + \cdots + g(n-1) + g(n),$$

and thus we see

$$S_{n+1} = S_n + g(n+1).$$

- tl;dr** We can always get a recursive relation between S_n and S_{n+1} whenever S_n is defined as a “running total”.