Exercise 7.14. *[21H] Note:* Taken from Rudin [16] Prop. 3.41.

Let $(a_n)_n (b_n)_n$, be sequences, let $A_n = \sum_{k=0}^{n} a_k$ and $A_{-1} = 0$, $0 \leq p \leq q$, then

$$\sum_{n=p}^{q} a_n b_n = \sum_{n=p}^{q-1} A_n(b_n - b_{n+1}) + A_q b_q - A_{p-1} b_p \quad .$$