

The total amortized cost of n operations is

$$\begin{aligned}\sum_{k=1}^n c'_k &= \sum_{k=1}^n (c_k + \Phi(D_k) - \Phi(D_{k-1})) \\ &= \Phi(D_n) - \Phi(D_0) + \sum_{k=1}^n c_k \\ &\geq \sum_{k=1}^n c_k\end{aligned}$$