17.3-3

二叉最小堆. extract-min 操作还要维护堆的性质

ex: $O(1) = o(\lg n) + \Phi(D_i) - \Phi(D_{i-1})$

in: $O(\lg n) = o(\lg n) + \Phi(D_i) - \Phi(D_{i-1})$

$\Phi(D_i) = \sum_{i=1}^{n} \lg i$, n = size of heap

对于 extract-max, $\Phi(D_i) - \Phi(D_{i-1}) = -\lg n$

对于 insert, $\Phi(D_i) - \Phi(D_{i-1}) = \lg n$

17.4-2 $\alpha_{i-1} \geq \frac{1}{2}$, delete

若 $\alpha_i \geq \frac{1}{2}$ $\quad \hat{c}_i = 1 + (2num_i - size_i) - (2num_{i-1} - size_{i-1})$

$= -1$

若 $\alpha_i < \frac{1}{2}$ $\quad \hat{c}_i = c_i + \Phi_i - \Phi_{i-1}$

$= 1 + (size/2 - num) - (2num_{i-1} - size_{i-1})$

$= 2 + \frac{3}{2} size_{i-1} - 3\alpha_{i-1} size_{i-1}$

$\leq 2 + \frac{3}{2} size_{i-1} - \frac{3}{2} size_{i-1}$ $(\because \alpha_{i-1} \geq \frac{1}{2})$

$= 2$