Deterministic Select (vector $\mathbf{A}$ of size n, integer $k \leq n$)

1: **if** $n == 5$ **then**
2: Sort $\mathbf{A}$ and return the element in k-th position.
3: **end if**
4: Partition $\mathbf{A}$ into vectors $\{\mathbf{B}_i\}_{i=0}^{(n/5)-1}$, where each vector $\mathbf{B}_i$ has 5 elements.
5: **for** $0 \leq i < n/5$ **do**
6: $\mathbf{C}$[i] = **Deterministic Select**($\mathbf{B}_i$, 3)
7: **end for**
{/* $\mathbf{C}$ is a $(n/5)$-long vector, where the i-th entry is the median of $\mathbf{B}_i$ */}.
8: (*median-of-medians*) p= **Deterministic Select**($\mathbf{C}$, $(n/10)$)
9: Partition $\mathbf{A}$ into three sub-vectors $\mathbf{A}_{<p}$, $\mathbf{A}_{=p}$, and $\mathbf{A}_{>p}$.
{/* $\mathbf{A}_{<p}$ has all elements of $\mathbf{A}$ that are less than p. */}
{/* $\mathbf{A}_{=p}$ has all elements of $\mathbf{A}$ that are equal to p. */}
{/* $\mathbf{A}_{>p}$ has all elements of $\mathbf{A}$ that are greater than p. */}
10: **if** $k \leq length(\mathbf{A}_{<p})$ **then**
11: **return Deterministic Select**($\mathbf{A}_{<p}$, k)
12: **else**
13: **if** $k > length(\mathbf{A}_{<p}) + length(\mathbf{A}_{=p})$ **then**
14: **return Deterministic Select**($\mathbf{A}_{>p}$, $k - length(\mathbf{A}_{<p}) - length(\mathbf{A}_{=p})$)
15: **end if**
16: **else**
17: **return** p
18: **end if**