NTUCSIE ADA 2015
Mini-Homework 14
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Answer

Method. Let the sequence $\langle a_n \rangle$ be the input. Find a number c, such that $c < 0, |c| > a_k, for\ 0 \leq k < n$. We can find c in $O(n)$ time. Then insert c between every $a_k, a_{k+1}, for\ 0 \leq k < n-1$, and thus the new sequence will be $\langle a_0, c, a_1, c, a_2, \ldots, c, a_{n-1} \rangle$, and let it be $\langle b_{2n-1} \rangle$. This process will also be done in $O(n)$ time, and let $\langle b_{2n-1} \rangle$ be the input of the RMSQ problem, and then the output will be what we want in RMQ. The entire reduction process is $O(n) + O(n) \Rightarrow O(n)$.

Example.

Data: $\langle a_n \rangle = \langle 6, 8, 12, 46, 7, 18, 5 \rangle$
Result: Largest number in $\langle a_n \rangle$. (46)
REDUCTION-FROM-RMQ-TO-RMSQ:
Find a number c smaller than any inverse of numbers in $\langle a_n \rangle$. (ex: -50);
Insert c into $\langle a_n \rangle$, thus convert it into $\langle b_{2n-1} \rangle$.
$(\langle b_{2n-1} \rangle = \langle 6, -50, 8, -50, 12, -50, 46, -50, 7, -50, 18, -50, 5 \rangle)$;
RMSQ($\langle b_{2n-1} \rangle$)(expected to return (k, k)) (outputs (6, 6), which implies 46);
return b_k (46);
end