15-210 Assignment RangeLab

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Section E

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5: Range Queries

Task 5.2

We can parallelize the algorithm by instead of doing iter we would use the function reduce. The only way that this works is if the function that we apply is associative. That way we would do a divide and conquer on the sequence. At each level the level of the work would be approximately logn and there would logn levels. Thus the total span would be $log^2(n)$.

Task 5.3

There would be around $O(n^2)$ nodes. This as in the sweep algorithm, when we move left we include more and more nodes. In the case of this we always add another y-value to the table at each point that we apply our function to. Thus we have it so that as we go across the sequence we keep adding a single node to the table that we assign to an x-value. Thus at the end we would have a table of n nodes that we are assigning with the last x-value. So in reality the number of nodes would be a summation from 1 to n and which is of $O(n^2)$.