Week 1 exercises

Problem 1: Show that, if a B-tree has height $h$, at most $O(h)$ I/Os are needed to handle an insertion. Count an I/O if you need to read or write a node. In general, $O(f(x))$ represents a function that is at most $cf(x)$ where $c$ is a constant independent on $x$. In other words, $O(h)$ means a function at most $ch$, for some $c$ not related to $h$.

Problem 2: Repeat the above for deletion.

Problem 3: Modify a B-tree to solve range max queries (i.e., range aggregation where the aggregate function $F = \text{MAX}$). If the height of the B-tree is $h$, your solution should answer any query in at most $2h - 1$ I/Os.