1123-05-221 **Howard Skogman** and **Rebecca Smith*** (rnsmith@brockport.edu). *Sorting permutations using $t+1$ passes through a stack.* Preliminary report.

Knuth showed that a permutation π can be sorted by a stack (meaning that by applying push and pop operations to the sequence of entries $\pi(1), \ldots, \pi(n)$ we can output the sequence $1, \ldots, n$) if and only if π avoids the permutation 231, i.e., if and only if there do not exist three indices $1 \leq i_1 < i_2 < i_3 \leq n$ such that $\pi(i_1), \pi(i_2), \pi(i_3)$ are in the same relative order as 231.

We consider the number of passes a permutation needs to take through a stack if we only pop the appropriate output values and start over with the remaining entries in their original order. We define a permutation π to be $(t+1)$-pass sortable (and having tier at most t) if π is sortable using $t+1$ passes through the stack. Permutations that are 1-pass sortable are simply the stack sortable permutations as defined by Knuth.

We show that the $(t+1)$-pass sortable permutations are a permutation class for all values of t. We also provide an exact enumeration for the tier t permutations by giving a bijection between these permutations requiring exactly $t+1$ passes to be sorted and certain sequences considered by Parker of nonnegative integers with values restricted by position and with t descents. (Received August 26, 2016)