Define a \( k \)-convex permutation \( \pi : [n] \rightarrow [n] \) to be a bijection obeying the condition \( 2\pi(i) \geq \pi(i - 1) + \pi(i + 1) - k \) for all \( i \in \{2, 3, \ldots, n - 1\} \) for fixed \( k \geq 0 \), and denote the number of \( k \)-convex permutations of length \( n \) by \( f_k(n) \). We attempt to determine \( f_k(n) \) for \( k = 0, 1, \) and \( 2 \), cases under which these permutations satisfy nice properties; in particular, they are consecutive 213 and 312 avoiding. We show that \( f_0(n) \) is precisely 8 for \( n > 4 \) and demonstrate, for \( k = 1, 2 \), a method of exhaustively constructing \( k \)-convex permutations. We construct an infinite ”descendant digraph” for \( k = 1 \) and \( k = 2 \), and use the transfer matrix method with generating functions to determine \( f_1(n) \), give a partial solution for \( f_2(n) \), and demonstrate that it is possible to give arbitrarily tight exponential bounds in both cases.

Similarly, we define \( k \)-convex words on a \( p \)-alphabet to be functions \( g : [n] \rightarrow [p] \) satisfying \( 2g(i) \geq g(i - 1) + g(i + 1) - k \) for all \( i \in \{2, 3, \ldots, n - 1\} \). We demonstrate that it is possible to find a generating function \( G_{p,k} \) for any values of \( p, k \), and show that the number of 0-convex words is eventually constant in \( n \) for any \( p \), giving an expression for this constant in \( p \) related to the integer partition numbers. (Received September 09, 2014)