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Bijjective enumeration of permutations starting with a longest increasing subsequence.

We give a bijective proof of an inclusion-exclusion type formula for $\#\Pi_{n,k}$, the set of permutations in S_n whose first $n - k$ elements are increasing and whose largest increasing subsequence has length exactly $n - k$. We exhibit two bijective proofs, one involving the RSK correspondence and another involving only permutations. Both approaches give direct rise to a q -analogue of the enumeration formula with statistic the major indices of the inverse permutations of $\Pi_{n,k}$. This problem originated in the recent research of Adriano Garsia and a \$ 100 prize was offered for its bijective proof, awarded to the author. (Received September 20, 2009)