

The X -descent set of a permutation

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Abstract: Let X be a subset of $\{(i, j): 1 \leq i, j \leq n, i \neq j\}$. The X -descent set of a permutation $w = a_1 \cdots a_n \in S_n$ is defined by $X\text{Des}(w) = \{i: (a_i, a_{i+1}) \in X\}$. If $X = \{(i, j): n \geq i > j \geq 1\}$, then $X\text{Des}(w) = \text{Des}(w)$, the ordinary descent set. We define a quasisymmetric function U_X which is a generating function for permutations $w \in S_n$ according to their X -descent set. It turns out that U_X is a symmetric function whose properties we will discuss. We also discuss some connections with Hamiltonian paths in digraphs.