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THE X-DESCENT SET OF A PERMUTATION

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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 $\mathrm{XDes}(w) = \{i : (a_i, a_{i+1}) \in X\}$. If $X = (i,j) : n \geq i > j \geq 1$, then $\mathrm{XDes}(w) = \mathrm{Des}(w)$, 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, including some connections with Hamiltonian paths in digraphs.