1123-05-26 **Bruce E. Sagan*** (sagan@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824. *Descent and peak polynomials.* Preliminary report.

A permutation $\pi = \pi_1 \dots \pi_n$ in the summetric group $\mathfrak{S}_n$ has *descent set* $\operatorname{Des}\pi = \{i \mid \pi_i > \pi_{i+1}\}$. Given a set S of positive integers and $n > \max S$, the *descent polynomial* of S is the cardinality $d(S;n) = \#\{\pi \in \mathfrak{S}_n \mid \operatorname{Des}\pi = S\}$. It is easy to prove, using the Principle of Inclusion and Exclusion, that this is a polynomial in n. However, properties of this polynomail do not seem to have been studied much in the literature. The *peak set* of π is $\operatorname{Pea}\pi = \{i \mid \pi_{i-1} < \pi_i > \pi_{i+1}\}$. Recently Billey, Burdzy, and Sagan proved that $\#\{\pi \in \mathfrak{S}_n \mid \operatorname{Pea}\pi = S\} = p(S;n) \cdot 2^{n-\#S-1}$ where $p(S;n)$ is a polynomial in n which they dubbed the *peak polynomial* of S. These polynomials have since received the attention of a number of researchers. In this talk we will compare and contrast these two polynomials talking about their degrees, coefficients when expanded in the basis of binomial coefficients, roots, and analogues in other Coxeter groups. (Received August 03, 2016)