

# Temple University Mathematics Colloquium

Bruce Sagan

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will speak on

## Graph coloring and symmetric functions

Let  $G$  be a combinatorial graph with vertices  $V$  and edges  $E$ . A proper coloring of  $G$  is a function  $c$  from  $V$  to  $\{1, 2, \dots, n\}$  such that if  $uv$  is an edge then  $c(u)$  does not equal  $c(v)$ . This is the same restriction as in the famous Four Color Theorem. In 1912–13, Birkhoff showed that the number of proper colorings is a polynomial in  $n$ , called the chromatic polynomial  $P(G; n)$ , which has many wonderful properties. More recently, Stanley showed that one can associate with  $G$  a symmetric function  $X(G; x)$  which reduces to  $P(G; n)$  under specialization of the variable set  $x$ . But  $P(G; n)$  satisfies a deletion-contraction law which is useful for inductive proofs of its properties, while  $X(G; x)$  does not. We will show how one can derive such a law using symmetric functions in noncommuting variables and give applications. No background about graph coloring or symmetric functions will be assumed.

MONDAY, JANUARY 24, 2005

LECTURE AT 4:00 PM (#)

COFFEE, TEA, AND REFRESHMENTS FROM 3-5 PM.

ROOM 617, WACHMAN BUILDING

DEPARTMENT OF MATHEMATICS