Meeting: 1003, Atlanta, Georgia, AMS CP 1, AMS Contributed Paper Session

1003-05-1296 **Dennis P Walsh*** (dwalsh@mtsu.edu), P.o. Box X070, Middle Tennessee State University, Murfreesboro, TN 37132. *Counting Cycle-Free Finite Functions.* Preliminary report.

For a function f and a positive integer k, let f^k denote the k-fold composition of f with itself. For example, $f^3(x) = f(f(f(x)))$. A function f is cycle free if and only if, for every x in the domain of f, there exists no k such that $f^k(x) = x$. For example, $f : 1, 2, 3 \rightarrow 1, 2, 3, 4, 5$ defined by $f(x) = x + 2$ is cycle free. Now let $[m]$ denote the set of the first m positive integers; let A denote the set of cycle-free functions from $[n]$ to $[n + r]$; and let B denote the set of functions from $[n]$ to $[n + r]$ that restrict the image of 1 to $n + 1, ..., n + r$. We construct a bijection from B to A and thus show that the cardinality of A is $r(n+r)^(n-1)$. We then relate the cardinality of A to a binomial-type sequence, to a class of labeled forests, to a unique differential operator, and to a factor in the probability mass function of a generalized Poisson distribution. (Received October 04, 2004)