Chromatic Polynomial of a Cycle of size n

The chromatic polynomial of a graph G is denoted by $P(G, \lambda)$ and is defined as the number of proper colorings of the graph G using at most λ colors. Here, we prove that for the cycle C_n of order n, the chromatic polynomial is $P(C_n, \lambda) = (\lambda - 1)^n + (-1)^n(\lambda - 1)$.