

## Polynomial Chebyshev Quotients, Combinatorially

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For any graph  $G$  we may construct an associated polynomial called the matching polynomial, which is a variant on a generating function for matchings of  $G$ . When  $G$  is a cycle graph with  $n$  vertices, the resulting polynomials are essentially the Chebyshev polynomials of the second kind  $T_n(x)$ , for which we have a complete characterization of their divisibility relations. We show that the various polynomial quotients of  $T_n(x)$  can be interpreted combinatorially: they are a certain average of matching polynomials for covering graphs, as introduced by Hall, Pruder and Sawin (2015). This work was made possible through the 2016 Graduate Research Workshop in Combinatorics.

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