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Rook Schur-Weyl Duality. Preliminary report.

We introduce two centralizer algebras: the rook-Brauer algebra $\mathbf{RB}_k(x)$ and the Motzkin algebra $\mathbf{M}_k(x)$ (which can be viewed as the rook-Temperley-Lieb algebra). These are constructed from the Brauer and Temperley-Lieb algebras in the same way that the rook monoid algebra is constructed from the symmetric group algebra: by allowing the omission of edges from basis diagrams. For certain choices of the parameter x , these algebras are in Schur-Weyl duality with the orthogonal group $\mathbf{O}_n(\mathbb{C})$ and the general linear group $\mathbf{GL}_2(\mathbb{C})$, respectively, on tensor space, just as the rook monoid is in Schur-Weyl duality with $\mathbf{GL}_n(\mathbb{C})$ on tensor space (Solomon, 2002). Beyond looking at the algebraic combinatorics of these two diagram algebras, we examine generalities of rook Schur-Weyl duality. (Received August 15, 2012)