

ABSTRACT. In this paper we explore the combinatorics of the non-negative part $(G/P)_{\geq 0}$ of a cominuscule Grassmannian. For each such Grassmannian we define \sqcup -diagrams — certain fillings of generalized Young diagrams which are in bijection with the cells of $(G/P)_{\geq 0}$. In the classical cases, we describe \sqcup -diagrams explicitly in terms of pattern avoidance. We also define a game on diagrams, by which one can reduce an arbitrary diagram to a \sqcup -diagram. We give enumerative results and relate our \sqcup -diagrams to other combinatorial objects. Surprisingly, the totally nonnegative cells in the open Schubert cell of the odd and even orthogonal Grassmannians are (essentially) in bijection with preference functions and atomic preference functions respectively.