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Alice Guionnet*, Ecole Normale Supérieure de Lyon, Lyon, France. *Free probability, Random matrices and map enumeration, I.*

Free probability is a theory initiated by D. Voiculescu in the eighties that studies non-commutative random variables. It is equipped with a notion of freeness, which is related with free products, and which plays the same role as independence in standard probability. Free probability is a natural framework to study random matrices at the limit where their size goes to infinity. Conversely, random matrices provide natural tools and concepts in free probability. In this talk, we will introduce basic concepts in free probability and show how to construct a wide variety of non-commutative laws by using random matrices. We will also describe some uses of free probability theory. (Received April 10, 2012)