INTEGRATION OVER THE P-ADIC NUMBERS

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Completing the field of rational numbers $\mathbb{Q}$ with respect to the usual absolute value, one gets the field of real numbers $\mathbb{R}$. There exists however, for each prime number p, also a p-adic absolute value on $\mathbb{Q}$. The completion with respect to this absolute value is called the field of p-adic numbers $\mathbb{Q}_p$. The p-adic numbers have a fascinating, and slightly peculiar structure. We will introduce the Haar measure on $\mathbb{Q}_p$, which allows us to talk about integration. If the function that we want to integrate, is of a certain form, then its integral can be calculated 'in the same way' for almost all prime numbers p. Using this theory we can study certain cases of the conjectures of Igusa and Denef-Sperber on exponential sums.