What are Rademacher functions?

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Abstract

The binary expansion of a given number is normally stored as a sequence of zeros and ones. However, the Rademacher functions $\{r_k(t)\}$ map the k-th binary digit of a number from 1 to -1 and from 0 to 1, resulting in a surprisingly useful construction. The functions form an incomplete orthonormal basis on [0,1] from which a complete basis, the Walsh system, can be constructed, and they also are a valuable instrument of proof. In this talk we will get an intuition for the Rademacher functions, use them to prove a classical formula, and explore their relations to probability theory and convergence.