Complexity of Leading Digit Sequences

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Measuring Complexity of Sequences

Motivation: “Simple” vs “Complex” Sequences

Random sequences (such as the first sequence above) are in some sense the most complex, whereas periodic sequences (such as the third sequence above) are in some sense the least complex. Between the two extremes, how complex are leading (i.e., first) digit sequences such as the second sequence above?

Main Problem: Complexity of Leading Digit Sequences

Results and Conjectures

References

Related Results

Benford’s Law

Benford’s Law (1938): A sequence S of real numbers satisfies Benford’s law for base b if for each d = 1, 2, . . . , b − 1, Pleading digit in base b is d) = logb(1 + 1/d).

Diaconis (1997): The sequence (a^n) satisfies Benford’s law in base b if logb(a) / Q ∈ Q.

• Allouche, J.-P., Surveying some notions of complexity for finite and infinite sequences, RIMS Kokyuroku Bessatsu, B34, pp. 27-37, 2012
• Kak, S., The Leading Digit in Base b of an Integer, RIMS Kokyuroku Bessatsu, B34, pp. 72-81