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Automatic sequences, logarithmic density, and fractals

Let $f(n)$ be an automatic sequence. We consider the *logarithmic frequency* with which a given letter occurs in this sequence. We completely classify all possible values that can be attained as a logarithmic frequency. Interestingly, the logarithmic frequency is often a ratio of logarithms of natural numbers. Using this motivation, we discuss how to associate a fractal to our automatic sequence whose Hausdorff dimension is equal to the logarithmic frequency with which a given letter occurs.