The Diagonalization Paradox Expanded

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Abstract

In 1891 Georg Cantor published his Diagonal Method which, he asserted, proved that the real numbers cannot be put into a one-to-one correspondence with the natural numbers. In this paper we will see how by varying the initial conditions of Cantor's proof we can use the diagonal method to produce a one-to-one correspondence between the set of natural numbers and the set of infinite binary decimals in the interval (0, 1). In the appendix we demonstrate that using the diagonal method recursively will, at the limit of the process, fully account for all the infinite binary decimals in (0, 1). The proof will cement the one-to-one correspondence between the natural numbers and the infinite binary decimals in (0, 1).

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