

Thesis Defense

On the Density of Abundant Numbers

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Abstract

A natural number is called abundant if the sum of its proper divisors does not exceed the number itself. The set of abundant numbers has a positive asymptotic density which has been calculated by Deléglise to be about 0.247. We will begin by considering results on the computational complexity of the algorithm used by Deléglise as well as recent improvements to the algorithm which allow us to discover the next decimal digit. Another natural approach to compute this density is to consider “primitive” members of the sequence, namely those not divisible by any smaller member, and then consider their multiples. However the inclusion–exclusion inherent here threatens to explode. I will show how to control this explosion to yield a different viable method for computing the density of the abundants.