Perfect numbers essay sample

Perfect numbers are a set of integers whose divisors all add up to that number. The number six is one such perfect number since its divisors, one, two, and three all add up to six ($1 + 2 + 3 = 6$). The next perfect numbers are 28, 496 and 8128. Perfect numbers have been studied by the Greeks who ascribed important numerological properties to these numbers. The Pythagoreans are credited with first calling these numbers as perfect. Saint Augustine – a pillar of Christian theology – remarked that God chose to create the world in six days rather than one since six is a perfect number.

Euclid made the first breakthrough in the study of perfect numbers with his discovery of a generating function. Euclid noticed that perfect numbers are of the form $(2^k – 1) (2^{k-1})$ where 2^k and 2^{k-1} are powers of two and $(2^k – 1)$ is a prime number. This leads to the following conjecture made by Euclid in Book IX of his *Elements* : if $(2^k – 1)$ is a prime number, then $(2^k – 1) (2^{k-1})$ is a perfect number. We can easily verify this with the first four perfect numbers: $6 = (2 \times [4-1])$, $28 = (4 \times [8-1])$, $496 = (16 \times [32 -1])$ and $8, 128 = (64 \times [128 – 1])$.

We should mention that a number of the form $(2^k – 1)$ is called a Mersenne Number and that prime Mersenne Numbers are called Mersenne Primes. Thus, the search for perfect numbers is related to the search for Mersenne Primes since all Mersenne Primes generate perfect numbers as per Euclid's conjecture. Another important thing of note is that all known perfect numbers are even. There are currently major research and searches for the first odd perfect numbers.

For this assignment, I chose perfect numbers due to their peculiar properties as well as their rarity. I initially searched Wikipedia for initial information. I know that Wikipedia is an unreliable source due to its nature, thus I made sure that Wikipedia is not my primary resource. The Wikipedia article is however very useful since it lists a multitude of sources which can be trusted. I say this since the linked sources came from academic institutions, research institutions or mathematical journals. These websites then linked to other reliable websites. This is the power of the internet as a research tool. With a few keyboard strokes and mouse clicks, I had " traveled" through several useful and reliable sources of information. Moreover, I was even made aware of sources of information that I didn't know existed in the first place such as the On-Line Encyclopedia of Number Sequences by AT&T. Clearly, the Internet proved to be a useful tool for research on this assignment.

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