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The Ordering of the Divisors of an Integer and Related Number Theoretical Functions

The purpose of this research was to explore the set ordering of the divisors of an integer n as well as the two closest divisors. This was done by creating number theoretic functions, such as τ and σ , in order to study properties of integers. These number theoretic functions were defined as: $F(n)=(x,y)$ an ordered pair of the two closest divisors of n $\Delta(n)=x-y$. The problem that this research seeks to resolve is a way to order all the divisors of an integer n . A special case that was heavily looked upon is when $n = plqm$, thus $F(plqm)$. These functions were studied from different points of view to further the understanding of this research. Firstly, these functions were looked at as a directed graph, for example a tree graph. Also these were looked at as a semi-group of ordered comparisons, and lastly, these were studied using rational approximations to represent irrational numbers with the use of continued fractions and their convergent. Using inductive and deductive reasoning, many connections have been found. First, it can be concluded that only two precise relationships between both primes of n are needed to fully order the set of divisors of n . Secondly, different formulas have been developed for all integers n where n is divisible by one prime or two distinct primes. Lastly, the conclusion has led to an astounding understanding of the creation of a fully ordered set of the divisors of n through the methods mentioned.