An Exploration in Differentiating Common Differences and their Algebraic Analogs

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Abstract

Mathematics is itself the study of patterns in such a way that is understandable by humans. By tinkering around with the relationships of numbers, mathematicians have discovered an innumerable amount of "cool" patterns, like Pascal's Triangle. This paper analyzes the patterns of geometric sequences by applying differentiation techniques to uncover the base numbers that lie underneath not-so apparent equations. Interestingly enough, this paper finds that the coefficients of the equations are in direct correlation to the numbers which appear due to the binomial theorem. Due to the differentiation, the equations can be separated into "layers" by their highest degree. This paper finds that while the equations may describe different patterns, so long as they remain in the same "layer", they are relatable by a small factor.