P-Adic Analysis of Elliptic Curves: Exploring the Relationship Between P-Adic Curve Theory and Ellipse Geometry

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The intersection of p-adic curve theory and ellipse geometry constitutes a field of geometric research. The relevance of elliptic curves is based on the proof of Fermat's last theorem. Geometrically, the essence of the ellipse lies in distance, center, and major axis. Besides the p-adic curve theory involves operations that naturally include the use of points. A p-adic equation was developed to characterize the properties of ellipses in p-adic space, using ten random combinations of prime numbers transformed into their p-adic form. The relationship between p-adic curves and ellipse geometry was explored seeking a connection between the two. Through analysis, was revealed that such a relationship lies within the range of decimals, confirming that each ellipse can be a p-adic curve although, not all p-adic curves can be ellipses. The value 3.24 was evaluated on the p-adic plane, converting it to 3.56 on the geometric plane. The integer unit (P) was 3, with a difference of 0.32 on the graph. The correlation coefficient (r) was 0.70, indicating a considerable positive correlation and the significance was 0.02. In the future, it is proposed to evaluate the algorithm using specific geometric problems and measure its efficiency compared to other existing methods of cryptography. For example, develop algorithms to reprogram the orbits of objects considered to be satellite space junk.

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