

In the thesis we study formal power series, an extension of the algebraic notion of a polynomial with a canonical metric. We define all the necessary tools, including said metric, composition and formal derivative. We prove basic theorems concerning these notions, such as the characterization of infinite sum convergence, proving some basic properties of composition and proving some analytical formulas about the derivative. We then focus on the Lagrange-Jacobi four-square theorem and define and use Gauss' coefficients to prove some more complex theorems, such as Jacobi's triple product formula and Roger-Ramanujan identities. We then use most of them to prove the mentioned four-square theorem.