

Mean Value Theorem, Maximum Principle and Riemann's Second Derivative Theorem

The Mean Value Theorem and the Maximum Principle for harmonic functions are very important results in the study of partial differential equations (PDEs) which lead to a number of significant consequences, such as the uniqueness or other qualitative properties of solutions of certain PDEs. In this talk I will present some useful ideas for the proof of the maximum principle and mean value theorems for harmonic functions which stem from the proof of Riemann's second derivative theorem. I will conclude my presentation by considering the weak maximum and minimum principles in the context of certain elliptic partial differential equations. The talk will be accessible to everyone with a basic knowledge of calculus.