Introduction to the Mathematics

Richard A. Tapia has written numerous papers on mathematics. One of his papers , which we are going to focus on, is entitled "The Weak Newton Method and Boundary Value Problems." The purpose of this paper is to apply the Kantorovich theorem to "a class of two point boundary value problems containing the Euler-Langrange equation for simple variational problems and most second order ordinary differential equations."

Tapia's work in this paper consisted of working with very complicated differential equations. He wanted to be able to understand how they work and to find their maximum and minimum points. In order to find these points, he used an equivalent method that involves finding the root of the derivative (i.e. where the derivative is 0). This technique is called the Weak Newton Method.

The Weak Newton Method is used to find numerical solutions. This method involves finding the Hessian matrix (or second derivative matrix) for an initial x, multiplying it by f, and subtracting it from our old x. In this method the matrix A is found only once. In regular Newton's method, which we are going to focus on, A is calculated multiple times. With this technique, we will take a look at the tangent line approximation and demonstrate an example of the actual procedure.