Combinatorial Optimization

Disclaimer

This follows the lessons from Mr. Berrachedi given in course, major additions, changes or rearrangements can be applied on the course for the sake of clarity, better explainations or just subjective opinions, written by HADIOUCHE Azouaou.

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Chapter 1

Remainders

1.1. Unidimensional Optimization

Let $f : I \subset \mathbb{R} \to \mathbb{R}$ be a map, we have the following iterative methods to find the extremum points of f.

1. **Newton-Raphson Method:** for $f \in \mathcal{C}^2(I)$, we look for x such that $f'(x) = 0$, we define the sequence of points as x_0 is given near the solution and the iteration $x_{n+1} = x_n - f'(x_n)/f''(x_n)$.
2. **Secant Method:** for $f \in \mathcal{C}(I)$, we approximate f'' with the secant of f' on the points $(x_{n-1}, f'(x_{n-1}))$ and $(x_n, f'(x_n))$, thus we get the iteration $x_{n+1} = x_n - f'(x_n) \cdot (x_n - x_{n-1})/(f'(x_n) - f'(x_{n-1}))$.
3. **Binary**

Chapter 2

Introduction

Optimization in general is the process of finding minimum or maximum of numerical functions, i.e. functions $f : E \to \mathbb{R}$ where E is a set. In the case of combinatorial optimization, we consider the set to be discrete, that is, we take the sets to be finite or countable. The notations and the terminology all comes from the Continuous Optimization course.