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Introduction

Definition of Optimization:

— The process of making something as effective or functional as possible.

Importance in Engineering

he process of making something as effective or functional as possible.

Types of Optimization

- Linear Optimization : Involves linear relationships among variables. Example : resource allocation.
- Non-Linear Optimization Deals with problems where relationships are non-linear. Example: structural design.
- Integer Optimization: Optimization with integer constraints. Example: scheduling problems.
- Dynamic Programming: Solves complex problems by breaking them into simpler sub-problems. Example: control systems.

Mathematical Programming

- Gradient Descent: Optimization of a linear objective function subject to linear constraints.
- Non-Linear Programming (NLP): Optimization of non-linear objective functions
- Mixed-Integer Programming (MIP): Involves both integer and continuous variables

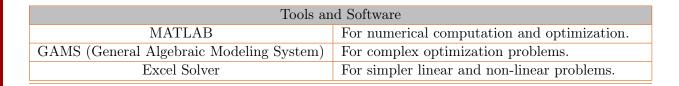
Computational Techniques

- Linear Programming (LP): An iterative optimization algorithm for finding the minimum of a function
- Newton's Method: Uses second-order derivatives to find roots or optimize functions

Optimization in Specific Engineering Fields



- Civil Engineering: Structural design and load optimization.
- Mechanical Engineering: Design of mechanical components for optimal performance.
- Electrical Engineering: Circuit design and signal processing optimization.
- Chemical Engineering: Process optimization and resource management.





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