Notes on System Modeling

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Chapter 1

Lecture 4: Title here

1.1 Homework

1.1.1 Biography: Leonhard Euler

15 April 1707 - 18 September 1783

Born in Basel, Switzerland, he began his education at a young age. His life would be greatly influenced by Johann Bernoulli, a friend of his father, and one of the most distinguished mathematicions of the time. This influence would greatly determine his life, as it was Johann who tutored him and convinced him to dedicate his life to the study of mathematics.

His contributions to humanity are great in number, and span across multiple fields of knowledge. Some of his many achievements are listed below.

- He laid the groundwork for graph theory by solving the problem of Königsberg's bridges.

- The Euler equation $e^{ix} = \cos x + i \sin x$, a contribution so important to mathematics it was called 'the most remarkable formula in mathematics' by Richard Feynman.

- Invented calculus of variations, and its most important result, the *Euler-Lagrange equation.*

1.1.2   Biography: Joseph-Louis Lagrange

25 January 1736 - 10 April 1813

Born in Turin, his life had been planned out by his father. He studied to become a lawyer at the University of Turin. He did not show interest in mathematics until the age of seventeen, an event of utmost importance. He delved into self-study and a year later he had become an accomplished mathematician. He contributed significantly to mathematics and physics, having published multiple works in France and Germany.

Through his correspondence with Leonhard Euler, they developed calculus of variations together. He eventually replaced Euler in Frederick of Prussia's court as mathematician. During that time he published his greatest work *Méchanique analytique*, a work so great it changed how physical problems were solved by moving from Newton's geometrical methods to methods of mathematical analysis.

1.1.3   Definitions

- Theorem. A mathematical statement that is proved using rigorous mathematical reasoning. In a mathematical paper, the term theorem is often reserved for the most important results.

- Axiom/Postulate. A statement that is assumed to be true without proof.

- Definition. A precise and unambiguous description of the meaning of a mathematical term. It characterizes the meaning of a word by giving all the properties and only those properties that must be true.

- Theory. A set of statements or principles devised to explain a group of facts or phenomena, especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena.