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- TEXTBOOK -

Mathematics for Transport and Traffic

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VOLUME ORGANIZATION

- Aim of the textbook: introduce the students to the main mathematical methods which are widely used in traffic and transport engineering, by using phenomena occurring in daily life, just in the abovementioned fields.

VOLUME ORGANIZATION

- Methodology: the text is organised so to each chapter consists of three steps;
 1. Definition of basic terminology and parameters which influence real phenomena in traffic and transport;
 2. Solution of simple examples of models representing existing situations or systems;
 3. Illustration of the procedures of the application of considered methods on the examples taken from real situations.

VOLUME ORGANIZATION: INDEX

A. PROBABILITY AND STATISTICS

1. Elements of theory of probability and statistics

- Introduction
- Definition of probability
- Discrete distributions
- Continuous random variables
- Continuous distributions

2. Linear and non-linear regressions

- Simple linear regressions
- Correlations
- Multiple linear regressions
- Direct non linear regressions

VOLUME ORGANIZATION

3. Testing of statistical hypotheses
 - One parameter test
 - Test of linear model
 - Student's test
4. Application of statistics in traffic and transport engineering
 - Normal distributions
 - Bernoulli distributions
 - Poisson distributions
 - Testing of statistical hypotheses
 - Studies of speed, travel time and delays

VOLUME ORGANIZATION

B. OPTIMISATION

1. Classical optimisation
2. Linear programming
3. Simplex method
4. Integer programming
5. Transportation problem

C. Theory of queues applied in transportation

1. General definitions
2. Queueing systems "born and die"
3. Markov chains
4. Network of chains
5. More general queueing systems
6. Examples: applications in transport systems