# Optimization and Simulation
## Simulation Exercise 1: Random Number Generation

**Bilal Farooq**

March 01, 2013

TRANSP-OR

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

# Introduction

- In this part of the course
  - We will develop a Traffic Simulation
  - The program will consists of function implementations based on the simulation lectures
  - To make the functions work, they must fit together
    - Consistent interfaces

# Implementation

- Code implemented in MATLAB
  - Consult the tutorial given in first lecture
    - MATH600-MATLABTutorial.pdf

# Topic: Random Number Generation

- 1.1: Exponential Random Number
- 1.2: Homogenous Poisson Process
- 1.3: Nonhomogenous Poisson Process

# 1.1 Exponential Random Numbers

- Unzip ex1-simulation.zip into your working directory
- Open `Exponential.m` in MATLAB
  - Browse through it
- Type `help Exponential` to see the description
- Implement the functionality
- Test your implementation by running `ExponentialTest.m`
- Try playing with the code…

# 1.2 Homogeneous Poisson Process

- Proceed as 1.1
- Use the template `HomogeneousPoissonProcess.m`
- Test with `HomogeneousPoissonProcessTest.m`
- Try playing with the code…

# 1.3 Nonhomogeneous Poisson Process

- Proceed as 1.1
- Use the template `NonhomogeneousPoissonProcess.m`
- Test with `NonhomogeneousPoissonProcessTest.m`
- Try playing with the code…
  - Sensitivity of results
  - Duration not constant

# Appendix: Implemented Functions

- `function rnd = Exponential(lambda)`
- `function times = HomogeneousPoissonProcess(lambda, duration)`
- `function times = NonhomogeneousPoissonProcess(lambda, duration)`

- Test functions for each generator…