Lab activity
Priority queues

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1 Introduction

The current lab activity was aimed at simulating queues which implement a form of customer priority in the evolution of their dynamics. To do so, the basic queue system presented in laboratory 1 has been equipped with a total of 2 servers and a policy to define priority.

## 2 Simulator's structure

2.1 Inputs

The input parameters of the simulator are the same as the ones presented in lab1 and lab9.

2.2 Outputs

The simulator outputs a plot for each combination of lambda, service time generation (whom details will be omitted from this report since the same approach proposed in previous lab activities has been used) and expectations used to provide each customer's service time.

2.3 Data structures and algorithms

There are three main classes in the simulator, Customer (which is a wrapper for simple customer properties like event type, arrival time, server serving its specific instance and its priority), Server (again a simple wrapper over a server status and the current customer being served) and a Logger class, which is highly suggested to leave configured with default verbosity of 0. As per the priority policy, the logic implemented inside the simulator serves **high-priority** customers first, interrupting service for **low-priority** ones if no server is **idle** at the time their arrival is scheduled at and only low-priority customers are being served. If every available server is busy serving high-priority customers, then an incoming high-priority customer is scheduled as **ready-to-be-served** inside the FES.
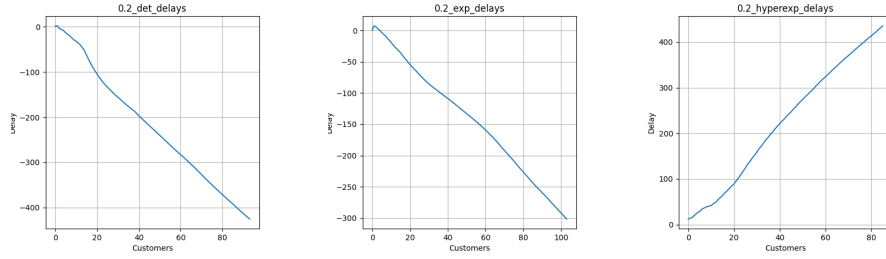
(a) Deterministic service time, $\lambda = 0.2$ delay

(b) Exponential service time, $\lambda = 0.2$ delay

(c) Hyperexponential service time, $\lambda = 0.2$ delay.

Figure 1: The parameters used for the hyperexponential service time where obtained via sympy for python with a correction over the resulting scale since the requested expectation yields a negative value.

3 Results

As per the simulator's output, Fig.1 shows an example of the experienced delays by every customer in the queue. The delays has been normalized w.r.t. its length to have a better understanding over its evolution.