M/M/1 queue (level 1)

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In the final task of blockly exercise for the chapter on Markov Chains in continuous time you learnt how we can perform a simulation of an M/M/1 queue and how you can thus calculate the total time that each customer spends within the queuing system. For this project I would like you to reproduce the programs that you learnt to write in the exericse and that simulate the queue within a python notebook. Use your program to calculate an estimate for the average ammount of time that each person will spend queueing and being served. Make sure to calculate confidence limits around your estimate for this average by using resampling. Also please compare the value you obtain numerically with the value that is obtained by inserting the parameters of your model into the analytic expression for this quantity that is derived in the notes. Do not include a derivation of the analytical result in your report and make sure you set the parameters of your model so that the rate of arrivals, λ, is less than the rate of service, μ.