M/M/1 queue (level 2)

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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. I would then like you to extend these programs so as to calculate a histogram that gives the probablity that the queue contains a particular number of customers at any given time and a numerical estimate for the average number of custeroms in the queue. Calculate confidence limits for all the averages that you compute in your report and make sure that you compare all the numerical results you obtain against the results that can be obtained by inserting the parameters of your numerical model into the analytical expressions that are in the notes. You do not need to include derivations for any the analytical results that you have used. Also set the parameters of your model so that the rate of arrivals, λ, is less than the rate of service, μ.