Performance indices of an M/M/1 queue

Consider a server that executes jobs arriving according to a Poisson process of rate λ *= 10 job/s*, and serves them with an average service time D *= 85 ms*.

Determine:

- The utilization of the system
- The probability of having exactly one job in the system
- The probability of having more than 5 jobs in the system
- The average queue length (job not in service)
- The average response time
- The probability that the response time is greater than 0.5 s.
- The 90 percentile of the response time distribution

- The utilization of the system
  U = 0.85
- The probability of having exactly one job in the system
  $p_1 = 0.1275$
- The probability of having more than 5 jobs in the system
  $\mathrm{p}(\mathrm{N} > 5) = 0.3771$
- The average queue length (job not in service)

  $$Q = 4.8167$$
- The average response time

  $$R = 0.5667\ s$$
- The probability that the response time is greater than 0.5 s.

  $$p(R > 0.5) = 0.4138$$
- The 90 percentile of the response time distribution

  $$\theta_R(90) = 1.3048\ s.$$