X

NPTEL

reviewer3@nptel.iitm.ac.in ▾

Courses » Introduction to Probability Theory and Stochastic Processes

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 14 - Week 12: Markovian Queueing Models

Course outline

- How to access the portal
- Week 0: Review Assignment
- Week 1
- Week 2
- Week 3
- Week 4
- Week-5 Higher Dimensional Distributions
- Week 6
- Week 7
- Week 8
- Week 9
- Week 10
- Week 11
- Week 12: Markovian Queueing Models
- Introduction to

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-10-24, 23:59 IST.

Each of the following questions has four options out of which one or more options can be correct. Individual marks are mentioned corresponding to each question. In the case of multiple answers, no partial marks will be awarded if all the correct choices are not selected. 0 marks for questions not attempted.

1) In which of the following queueing models, the waiting time of a customer is zero? ***2 points***

- [ ] M/M/1/10
- [ ] M/M/5/5
- [ ] M/M/1
- [ ] M/M/5

No, the answer is incorrect.
Score: 0

Accepted Answers:
M/M/5/5

2) Consider an M/M/1 model with arrival rate λ and service time following exponential distribution with mean $\frac{1}{\mu}$ such that $\lambda < \mu$. The average queue length is given by ***2 points***

- [ ] $\frac{\lambda^2}{\mu(\mu-\lambda)}$
- [ ] $\frac{\lambda}{\mu-\lambda}$
- [ ] $\frac{\lambda^2}{\mu^2(\mu-\lambda)}$
- [ ]

3) Consider an M/M/1 model with arrival rate λ and service time following exponential distribution with mean $\frac{1}{\mu}$ such that $\lambda < \mu$. The expected number of customers in the system is given by **2 points**

- $\frac{\lambda}{\mu(\mu-\lambda)}$
- $\frac{\lambda}{\mu-\lambda}$
- $\frac{\lambda^2}{\mu^2(\mu-\lambda)}$
- $\frac{\mu}{\mu(\mu-\lambda)}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{\lambda}{\mu-\lambda}$

4) Mr. Rajesh runs a one-person, unisex hair salon. He finds that customers seem to arrive according to a Poisson process with a mean arrival rate of 4 per hour. Because of his excellent reputation, customers were always willing to wait. The data further showed that customer processing time was exponentially distributed with an average of 10 minutes. The proportion of time, an arriving customer can walk right in without having to wait at all, is **2 points**

- 0.166
- 0.706
- 0.223
- 0.333

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.333

5) Mr. Rajesh runs a one-person, unisex hair salon. He finds that customers seem to arrive according to a Poisson process with a mean arrival rate of 4 per hour. Because of his excellent reputation, customers were always willing to wait. The data further showed that customer processing time was exponentially distributed with an average of 10 minutes. If an arriving customer finds exactly 2 customers in the system, what is his expected waiting time (in minutes)? **2 points**

- 10
- 20
- 30
- 0.33

No, the answer is incorrect.
Score: 0

Accepted Answers:
20

6) Consider that two identical M/M/1 queueing systems with the same rates λ and μ are in operation side by side (with separate queues) in a premises. The probability that there are a total of k number of customers in the two systems taken together in long-run is given by **2 points**

$(k)\rho^{k+1}(1-\rho)^2$

$(k+1)\rho^k(1-\rho)$

$(k+1)\rho^k(1-\rho)^2$

$(k)\rho^k(1-\rho)^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$(k)\rho^k(1-\rho)^2$

7) In an M/M/1 queueing model, suppose that customers arrive at a Poisson rate of 1 customer per 12 minutes and are serviced at the Poisson rate of 1 service every 8 minutes. Assume that the arrival rate is increased by 20%. In the steady state, increase in average time spent by the customer in the system is **2 points**

- 16 minutes
- 24 minutes
- 12 minutes
- 8 minutes

No, the answer is incorrect.
Score: 0

Accepted Answers:
16 minutes

8) Consider an M/M/1 queueing model. Assume that the customers arrive at a rate of 3 per minute. Given that 90\% of the time the queue contains less than or equal to 5 customers, the service rate is given by **2 points**

- 4.8
- 4.4
- 2.2
- 3.3

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.4

9) Let W_1 be the mean time spent in an M/M/1 system having arrival rate λ and service rate 2μ, whereas W_2 be the mean time spent in an M/M/2 system with arrival rate λ and service rate μ. Assume that $\lambda = \mu = 1$. Then **2 points**

$W_1 = W_2$

$W_1 < W_2$

$W_1 > W_2$

$W_1 = 2W_2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$W_1 > W_2$

10) Consider the online ticket reservation system of Indian Railways. Assume that customers arrive according to a Poisson process at an average rate of 100 per hour. Also assume that the time taken for each reservation by a computer server follows an exponential distribution. Find out at what average rate the computer server should issue an e-ticket in order to ensure that a customer will not wait more than 45 seconds with a probability of 0.95. Write the answer to nearest integer. ***2 points***

- [ ] 20 seconds
- [ ] 30 seconds
- [ ] 15 seconds
- [ ] 25 seconds

No, the answer is incorrect.
Score: 0

Accepted Answers:
20 seconds

Previous Page End