Questions

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Question 1

1 point possible (graded)

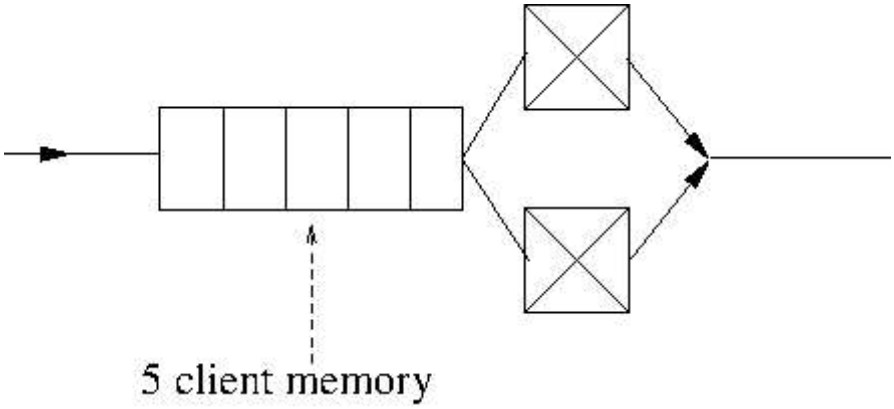

Figure 1. Question 1

Give the Kendall notation of the following system where the service discipline is FIFO, the arrivals are Poisson and the service times are exponentially distributed with parameter μ (cf. Figure 1).

- G/M/∞
- G/G/2/5
- M/M/2/5
- G/G/2/7
- M/M/2/7

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Question 2

1 point possible (graded)

Consider a queue with no assumption about the arrival traffic, an infinite number of servers, an infinite buffer and exponentially distributed service times. Give the Kendall's notation of this queue.

- M/M/1
- G/M/1
- M/M/∞
- G/M/∞
- M/M/1/∞
- G/M/1/∞
- G/G/1/∞

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Question 3

1 point possible (graded)

We consider a computer with a single CPU and a multitask operating system (i.e., it is able to process several programs in parallel and the processing capacity of the CPU is shared fairly among the different tasks).

We assume the number of programs to be potentially infinite on this computer. Program sizes are exponentially distributed (i.e., we assume that a program's execution time is exponentially distributed in the case where the program is executed alone on the computer). We have no knowledge about the arrival process of the programs.

We want to model the number of programs being executed simultaneously with a queueing system. What kind of queue can be used to model it?

- G/M/1
- M/M/∞
- G/M/∞/FIFO
- G/M/1/PS
- G/M/∞/PS

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Question 4

1 point possible (graded)

Consider an M/M/1 queue with arrival rate λ and service rate μ. Which of the following sentences is (are) true?

- [ ] If $\lambda < \mu$, then there is always at most one client in the queue.
- [ ] If $\lambda \geq \mu$, then there may be more than one client in the queue.

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Question 5

0.0/2.0 points (graded)

Which of the following quantities correspond to performance criteria?

- [ ] Mean number of customers
- [ ] Queue capacity
- [ ] Mean sojourn time
- [ ] Mean arrival rate
- [ ] Mean throughput

- [ ] Mean utilization rate

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Question 6

0.0/1.0 point (graded)

Consider a stable M/M/1 queue.

The probability distribution of the number of customers in the queue tends to a limit distribution:

- ○ True.
- ○ False.

The number of customers in the queue tends to a finite limit:

- ○ True
- ○ False

The steady state depends on the initial state:

- ○ True.
- ○ False.

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Question 7

0.0/2.0 points (graded)

Consider a post office with a single desk, which is modeled by an M/M/1 queue. The average number of arrivals per hour is 8 clients and the mean service time is 5 minutes.

What is the probability of finding 0 client in the office?

What is the probability of finding 1 client in the office?

What is the probability of finding 2 clients in the office?

What is the probability of finding 3 clients in the office?

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Question 8

0.0/2.0 points (graded)

Consider a post office with a single desk, which is modeled by an M/M/1 queue. The average number of arrivals per hour is 8 clients and the mean service time is 5 minutes.

What is the mean utilization rate of the queue?

What is the mean queue length?

What is the average response time (in hours)?

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Question 9

0.0/2.0 points (graded)

On average, there are 1.5 clients per hour arriving at the dentist's office. The average duration of a consultation is 30 minutes. On average, there are 3 people in the waiting room at each time instant t. What is the total time clients spend in the office (in hours)?

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Question 10

1 point possible (graded)

On average, there are two clients arriving per hour at the dentist's office. The average duration of the consultation is 20 minutes. On average, there are 3 people in the waiting room. Is it possible that this is an M/M/1 queue?

- Yes
- No

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Question 11

0.0/1.0 point (graded)

Consider an M/M/1 queue with a load of 0.8 Erlang and a service rate $\mu = 10\,\mathbf{sec}^{-1}$.

What is the value of the average number of clients N_S in the server?

What is the value of the output rate (in $\mathbf{sec}^{-1}$)?

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Question 12

1 point possible (graded)

The M/M/1/K queue is:

- a pure loss system
- a pure waiting system
- both a waiting and loss system

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