Questions

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Question 1

1 point possible (graded)

Consider a Poisson process with parameter λ. What is the unit of λ?

- without dimension
- the inverse of the time unit

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Question 2

1 point possible (graded)

The service time of a queue is always exponentially distributed.

- True
- False

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Question 3

1 point possible (graded)

Consider a queue with a single server. The service durations are constant and equal to one second. During the interval [0,3s], there are arrivals at 1s, 1.5s, 1.7s and 1.8s. What is the number of clients at time 2.71s?

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Question 4

1 point possible (graded)

Consider a queue with a single server and a finite capacity 3. The service durations are constant and equal to one time unit. During the interval [0,3s], there are arrivals at 1s, 1.5s, 1.7s and 1.8s. What is the number of clients WAITING at time 2.45s?

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Question 5

1 point possible (graded)

Consider the same problem as in question 4: a queue with a single server and a finite capacity 3, the service durations are constant and equal to one time unit and, during the interval [0,3s], there are arrivals at 1s, 1.5s, 1.7s and 1.8s. Let us denote by "A" the client arriving at 1s, "B" the one arriving at 1.5s and so on. What is the identifier of the client being served at time 3.5s?

- A
- B
- C
- D

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Question 6

1 point possible (graded)

An electric bulb has a lifetime that is exponentially distributed with an average of 1 year. It has been used for 10 months and it is still functioning. What is the probability that it will still be working in one year (two answers expected)? Let us denote by X the lifetime of the bulb in years.

- [ ] $P\left(X > 1 + \frac{10}{12} | X > \frac{10}{12}\right)$

- [ ] $P\left(X > \frac{10}{12}\right)$

- [ ] $P(X > 1)$

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Question 7

1 point possible (graded)

Consider a Poisson process for which there are 50 arrivals on average every 20 seconds. What is the value of its parameter λ (in s^{-1})?

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Question 8

2 points possible (graded)

Consider the following network (cf. Figure 1) with five nodes: A, B, C, D and E.

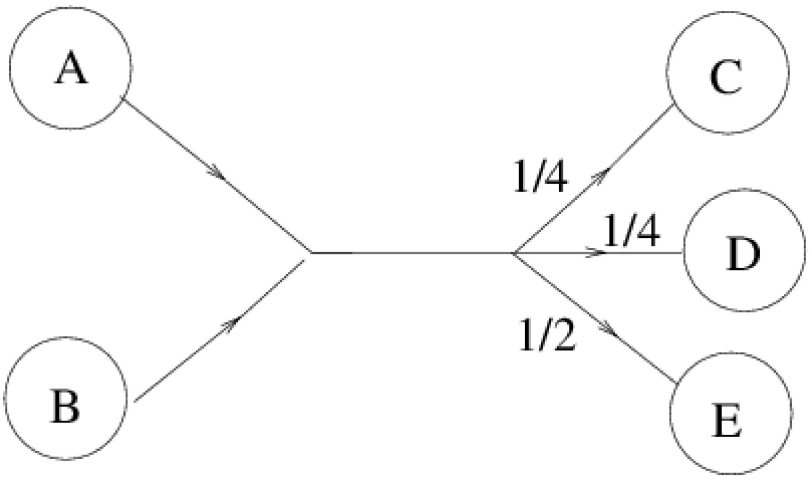

Figure 1. Question 8

A and B are sources generating traffic according to a Poisson process. The rate of source A is $10s^{-1}$. The time between two successive packets generated by source B is 0.2s on average. The traffic generated by both A and B is routed towards nodes C, D and E. One fourth of this traffic goes to node C, the same for D, and one half to node E.

What is the average rate of the traffic resulting from the superposition of sources A and B (in s^{-1})?

What is the average time between two successive arrivals at node D (in s with a precision of 0.01s)?

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Question 9

1 point possible (graded)

Consider the following queue with two servers in parallel (cf. Figure 2). The buffer has free space for five clients.

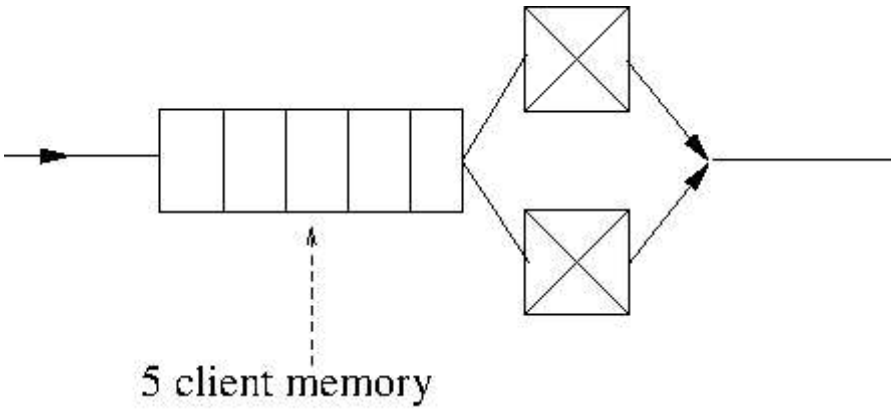

Figure 2. Question 9

The queue capacity is:

- 5
- 6
- 7

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Question 10

1 point possible (graded)

Consider a FIFO queue with deterministic interarrival times T and constant service times S. We assume that the clients are served in the same order as they arrive. The instantaneous number of clients in the queue is monitored. Which of the following curves (Figure 3) is NOT possible?

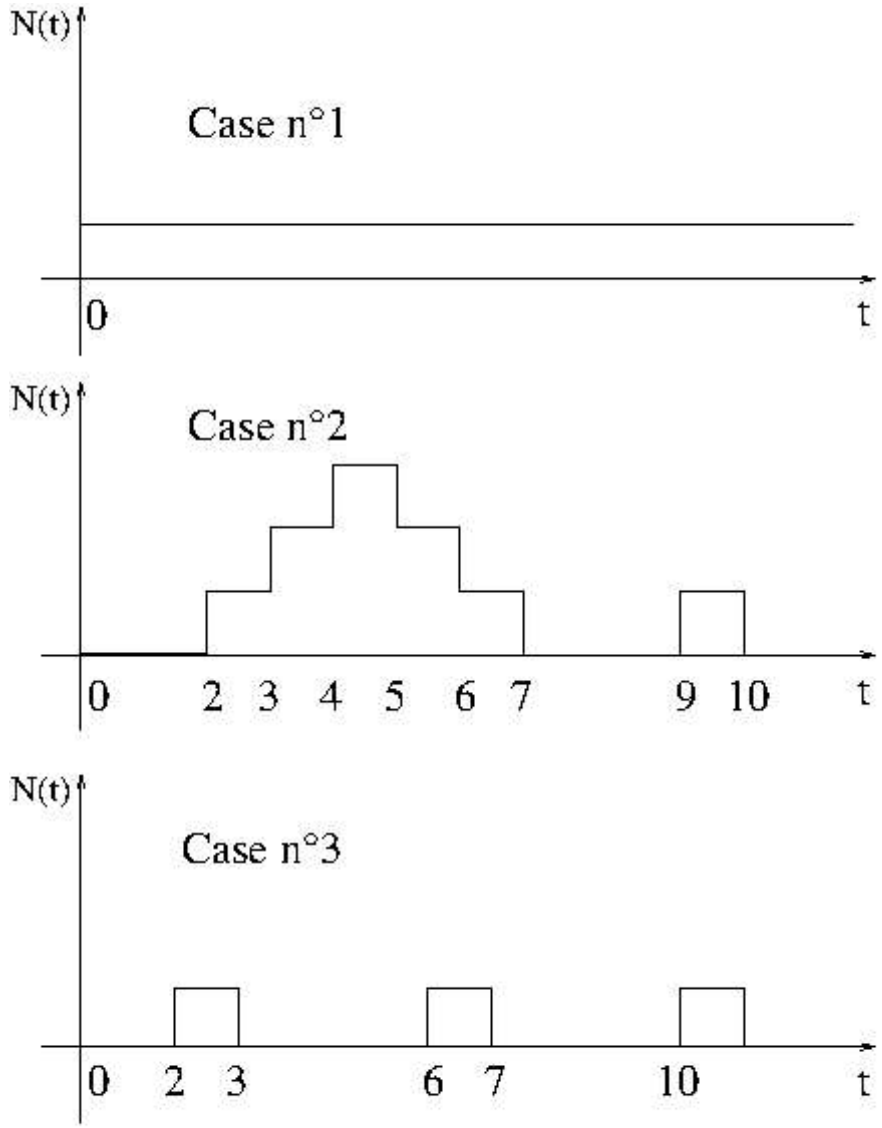

Figure 3. Question 10

- 1
- 2
- 3

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