

<u>Course</u> > <u>Unit 5:</u> ... > <u>Lec. 9:</u> ... > 6. Exer...

6. Exercise: Memorylessness of the exponential

Exercises due Mar 13, 2020 05:29 IST Completed

Exercise: Memorylessness of the exponential

3/3 points (graded)

Let X be an exponential random variable with parameter λ .

- a) The probability that X>5 is
 - $\bigcirc \lambda e^{-5\lambda}$
 - $igorup e^{-5\lambda}$
 - none of the above



- b) The probability that X>5 given that X>2 is
 - $\bigcirc \lambda e^{-5\lambda}$
 - $\bigcirc e^{-5\lambda}$
 - $\bigcirc \lambda e^{-3\lambda}$
 - $igorup e^{-3\lambda}$
 - none of the above

c) Given that X>2 , and for a small $\delta>0$, the probability that $4\leq X\leq 4+2\delta$ is approximately

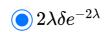
 $\bigcap \lambda \delta$

 $\bigcirc 2\lambda \delta$

 $\bigcirc \delta e^{-4\lambda}$

 $\bigcirc \, \lambda \delta e^{-4\lambda}$

 $\bigcirc \lambda \delta e^{-2\lambda}$



none of the above



Solution:

a) We have seen in the past that for an exponential random variable with parameter λ , ${\bf P}\left(X>a\right)=e^{-\lambda a}$, and so ${\bf P}\left(X>5\right)=e^{-5\lambda}$.

b) Because of the memorylessness property, given that X>2, the remaining time X-2 is again exponential with the same parameter. Thus,

$$\mathbf{P}\left(X > 5 \,|\, X > 2
ight) = \mathbf{P}\left(X - 2 > 3 \,|\, X > 2
ight) = \mathbf{P}\left(X > 3
ight) = e^{-3\lambda}$$

c) By memorylessness, this is the same as the unconditional probability that an exponential takes values in the interval $[2,2+2\delta]$, which is approximately the length, 2δ , of the small interval times the density evaluated at 2, yielding $2\lambda\delta e^{-2\lambda}$.

Submit

You have used 2 of 2 attempts



1 Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 5: Continuous random variables:Lec. 9: Conditioning on an event; Multiple r.v.'s / 6. Exercise: Memorylessness of the exponential

Show all posts	/ recent activi	ty 🗸
Confused on question c why can't I say that by memorylessness this is the same as the unconditional probability that an	expone	10
? About the answer to (c) Why is the answer not 2*lambda*delta*e^(2*lambda)? why is the the minus sign to the e? Thank	you all	1
Question of b) Why there used X-2?		1
I dont understand how we find question c) I dont understand how we find question c)	3 new_	8
Need help understanding the answer on question c Hi, I'm having issues with problem c, so I got it up to P(4 <x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to just solve it up to P(4<x<4+2d x>2) then I tried to Just solve it up to P(4<x<4+2d x>2) then I tried to Just solve it up to P(4<x<4+2d x>2) the I tried to P(4<x<4+2d x>2) the</x<4+2d x></x<4+2d x>	using ca	3
[STAFF] Typo in title Hello, I know this is of minor importance but there's a typo in letter b. The word *probability* is very a typo in letter b.	written	2
submit disabled having a problem submitting my answers anyone knows how to solve this and the deadline has remaining the deadline has remaining a problem.	not yet r	2
☑ Cannot figure out Q2	1 new_	3
Por exponential r.v. 's why is "approximating probability within a small time intervadifferent (non-conditional) than "computing probability within a large/open-ended interval" (conditional)? With regards to conditional probability of a lightbulb failing (a continuous exponential r.v.) After	<u>time</u>	4
Lengths of intervals Attention! Not all intervals have the same length.		1
Answer c, confusion I don't know why we didn't omit the 4s inside the probability and get the length of the small inter	val time	4