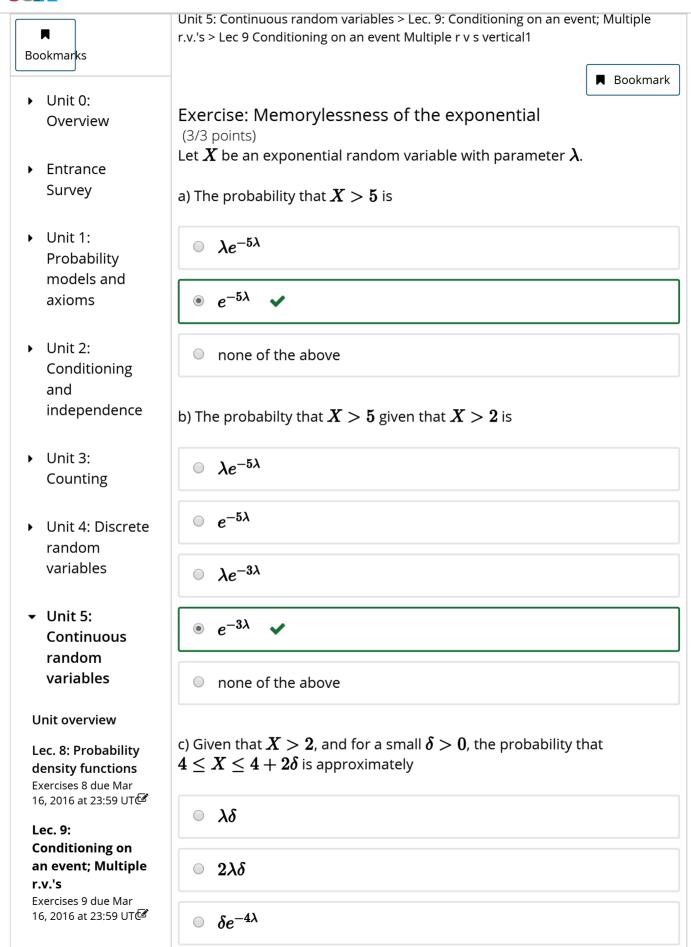


MITx: 6.041x Introduction to Probability - The Science of Uncertainty



Lec. 10: Conditioning on a random variable; Independence; Bayes' rule

Exercises 10 due Mar 16, 2016 at 23:59 UT 🗗

Standard normal table

Solved problems

Problem Set 5 Problem Set 5 due Mar 16, 2016 at 23:59 UT 🗗

Unit summary

- $\lambda \delta e^{-4\lambda}$
- $\lambda \delta e^{-2\lambda}$
- $2\lambda\delta e^{-2\lambda}$
- none of the above

Answer:

- a) We have seen in the past that for an exponential random variable with parameter λ , $\mathbf{P}(X>a)=e^{-\lambda a}$, and so $\mathbf{P}(X>5)=e^{-5\lambda}$.
- b) Because of the memorylessness property, given that X>2, the remaining time X-2 is again exponential with the same parameter. Thus,

$$\mathbf{P}(X > 5 \mid X > 2) = \mathbf{P}(X - 2 > 3 \mid X > 2) = \mathbf{P}(X > 3) = e^{-3\lambda}$$

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

You have used 1 of 2 submissions

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