



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



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## Exercise: Lightbulb burnouts

(1/1 point)

As in the preceding video, consider three lightbulbs each of which has a lifetime that is an independent exponential random variable with parameter  $\lambda = 1$ . The variance of the time until all three burn out is:

49/36

**Answer:** 1.36111

Recall that the variance of an exponential with parameter  $\lambda$  is  $1/\lambda^2$ .


**Answer:**

As we discussed, the time until all three lightbulbs burn out is the sum of an exponential random variable with parameter  $3\lambda$ , an exponential random variable with parameter  $2\lambda$ , and an exponential random variable with parameter  $\lambda$ . Furthermore, because of the fresh-start property, we argued that these three random variables are independent. Therefore, since  $\lambda = 1$ , the variance is


- ▶ Unit 6: Further topics on random variables
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- ▼ **Unit 9: Bernoulli and Poisson processes**

#### Unit overview

##### **Lec. 21: The Bernoulli process**

Exercises 21 due May 11, 2016 at 23:59 UTC 


##### **Lec. 22: The Poisson process**

Exercises 22 due May 11, 2016 at 23:59 UTC 

##### **Lec. 23: More on the Poisson process**

$$\frac{1}{3^2} + \frac{1}{2^2} + \frac{1}{1^2} = \frac{49}{36}.$$


*You have used 2 of 2 submissions*

Exercises 23 due May 11, 2016  
at 23:59 UTC 

**Solved problems**

**Additional theoretical  
material**

**Problem Set 9**

Problem Set 9 due May 11,  
2016 at 23:59 UTC 

**Unit summary**

► Unit 10: Markov  
chains

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