



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



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## Exercise: Splitting

(1/1 point)

For each exam, Ariadne studies with probability  $\frac{1}{2}$  and does not study with probability  $\frac{1}{2}$ , independently of any other exams. On any exam for which she has not studied, she still has a **0.20** probability of passing, independently of whatever happens on other exams. What is the expected number of total exams taken until she has had 3 exams for which she did not study but which she still passed?



Answer: 30


Answer:

The sequence of exams for which she does not study and passes can be modeled as follows. We look at the exams for which she has not studied (a Bernoulli process with parameter  $\frac{1}{2}$ ) and "split" it according to whether she passes or not. This creates a new Bernoulli process for the exams for which she does not study and passes, with parameter  $(\frac{1}{2}) \cdot 0.20 = 0.10$ . The expected time until 3 successes in this process is  $3/0.10 = 30$ .


- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
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- ▶ Unit 8: Limit theorems and classical statistics
- ▼ **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**


*You have used 1 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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