



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



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▶ Unit 1: Probability models and axioms
- ▶ Unit 2: Conditioning and independence
- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
- ▶ Unit 5: Continuous random variables

Unit 9: Bernoulli and Poisson processes > Problem Set 9 > Problem 5 Vertical: Arrivals during overlapping time intervals

Bookmark

Problem 5: Arrivals during overlapping time intervals

(8/8 points)

Consider a Poisson process with rate λ . Let N be the number of arrivals in $(0, t]$ and M be the number of arrivals in $(0, t + s]$, where $t > 0, s \geq 0$.

In each part below, your answers will be algebraic expressions in terms of λ, t, s, m and/or n . Enter 'lambda' for λ and use 'exp()' for exponentials. Do **not** use 'fac()' or '!' for factorials. Follow standard notation .

1. For $0 \leq n \leq m$, the conditional PMF $p_{M|N}(m | n)$ of M given N is of the form $\frac{a}{b!}$ for suitable algebraic expressions in place of a and b .


 $a =$

 $b =$


- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
- ▶ Exam 2
- ▶ 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

2. For $0 \leq n \leq m$, the joint PMF $p_{N,M}(n, m)$ of N and M is of the form $\frac{c}{n!d!}$ for suitable algebraic expressions in place of c and d .

lambda^m*t^n*s^(m-n)*exp(-lambda*(s+t))

 $c =$

m-n

 $d =$

3. For $0 \leq n \leq m$, the conditional PMF $p_{N|M}(n|m)$ of N given M is of the form $f \cdot \frac{g!}{n!h!}$ for suitable algebraic expressions in place of f , g , and h .

t^n*s^(m-n)/(t+s)^m

 $f =$


m

 $g =$

m-n

 $h =$


4.

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

$$\lambda t + \lambda^2 t s + \lambda^2 t^2$$



$E[NM] =$

You have used 2 of 3 submissions

DISCUSSION

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