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Problem 5: LLMS estimation with random sums

(4/4 points)

Let N be a geometric r.v. with mean $1/p$; let A_1, A_2, \dots be a sequence of i.i.d. random variables, all independent of N , with mean 1 and variance 1 ; let B_1, B_2, \dots be another sequence of i.i.d. random variable, all independent of N and of A_1, A_2, \dots , also with mean 1 and variance 1 . Let $A = \sum_{i=1}^N A_i$ and $B = \sum_{i=1}^N B_i$.

1. Find the following expectations using the law of iterated expectations. Express each answer in terms of p using standard notation .

$$\mathbf{E}[AB] = \boxed{(2-p)/p^2} \quad \checkmark$$

$$\mathbf{E}[NA] = \boxed{(2-p)/p^2} \quad \checkmark$$

2. Let $\hat{N} = c_1 A + c_2$ be the LLMS estimator of N given A . Find c_1 and c_2 in terms of p .

$$c_1 = \boxed{1-p} \quad \checkmark$$


$$c_2 = \boxed{1} \quad \checkmark$$

You have used 2 of 2 submissions


DISCUSSION

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Unit overview**Lec. 14:
Introduction to
Bayesian inference**

Exercises 14 due Apr
06, 2016 at 23:59 UTC 


**Lec. 15: Linear
models with
normal noise**

Exercises 15 due Apr
06, 2016 at 23:59 UTC 


Problem Set 7a

Problem Set 7a due
Apr 06, 2016 at 23:59
UTC 


**Lec. 16: Least
mean squares
(LMS) estimation**

Exercises 16 due Apr
13, 2016 at 23:59 UTC 

**Lec. 17: Linear
least mean
squares (LLMS)
estimation**

Exercises 17 due Apr
13, 2016 at 23:59 UTC 

Problem Set 7b

Problem Set 7b due
Apr 13, 2016 at 23:59
UTC 

Solved problems**Additional
theoretical
material****Unit summary**

- ▶ Unit 8: Limit theorems and classical statistics

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