

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



- Unit 0: Overview
- EntranceSurvey
- 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 6: Further topics on random variables

Unit overview

Lec. 11: Derived distributions
Exercises 11 due Mar
30, 2016 at 23:59 UT

Unit 6: Further topics on random variables > Problem Set 6 > Problem 7 Vertical: Sum of a random number of r.v.'s

■ Bookmark

Problem 7: Sum of a random number of r.v.'s

(4/4 points)

A fair coin is flipped independently until the first Heads is observed. Let K be the number of Tails observed **before** the first Heads (note that K is a random variable). For $k=0,1,2,\ldots,K$, let X_k be a continuous random variable that is uniform over the interval [0,3]. The X_k 's are independent of one another and of the coin flips. Let the random variable X be defined as the sum of all the X_k 's generated before the first Heads. That is, $X=\sum_{k=0}^K X_k$. Find the mean and variance of X. You may use the fact that the mean and variance of a geometric random variable with parameter p are 1/p and $(1-p)/p^2$, respectively.

$$\mathbf{E}[X] = \boxed{3}$$

$$\operatorname{var}(X) = \boxed{6}$$

You have used 2 of 2 submissions

DISCUSSION

Click "Show Discussion" below to see discussions on this problem.

Lec. 12: Sums of independent r.v.'s; Covariance and correlation

Exercises 12 due Mar 30, 2016 at 23:59 UT 2

Lec. 13:
Conditional
expectation and
variance revisited;
Sum of a random
number of
independent r.v.'s
Exercises 13 due Mar
30, 2016 at 23:59 UT

Solved problems

Additional theoretical material

Problem Set 6

Problem Set 6 due Mar 30, 2016 at 23:59 UT 🕏

Unit summary

Unit 7: Bayesian inference

© All Rights Reserved



© edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

















