



Bookmarks

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Unit overview

Lec. 11: Derived distributions

Exercises 11 due Mar 30, 2016 at 23:59 UTC

Unit 6: Further topics on random variables > Lec. 13: Conditional expectation and variance revisited; Sum of a random number of independent r.v.'s > Lec 13 Conditional expectation and variance revisited Sum of a random number of independent r v s vertical6



Bookmark

## Exercise: Second generation offspring

(2/2 points)

Every person has a random number of children, drawn from a common distribution with mean 3 and variance 2. The numbers of children of each person are independent. Let  $M$  be the number of grandchildren of a certain person. Then:

$\mathbf{E}[M] =$   ✓ Answer: 9

$\mathbf{var}(M) =$   ✓ Answer: 24

Answer:

Let  $N$  be the number of children and let  $X_i$  be the number of children of the  $i$ th chld. Then,  $M = X_1 + \cdots + X_N$ . It follows that  $\mathbf{E}[M] = \mathbf{E}[N] \cdot \mathbf{E}[X] = 3 \cdot 3 = 9$ . Furthermore,

$$\mathbf{var}(M) = \mathbf{E}[N]\mathbf{var}(X) + (\mathbf{E}[X])^2\mathbf{var}(N) = 3 \cdot 2 + 9 \cdot 2 = 24.$$

*You have used 1 of 2 submissions*

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

Exercises 12 due Mar 30, 2016 at 23:59 UTC

**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 UTC

Solved problems

Additional theoretical material

**Problem Set 6**

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

Unit summary

- Unit 7: Bayesian inference

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