7. Exercise: Sum of normals

Exercises due Mar 25, 2020 05:29 IST   *Completed*

Exercise: Sum of normals

3/3 points (graded)

Let X and Y be independent normal random variables.

a) Is $2X - 4$ always normal?

True ⌄	✔ **Answer:** True

b) Is $3X - 4Y$ always normal?

True ⌄	✔ **Answer:** True

c) Is $X^2 + Y$ always normal?

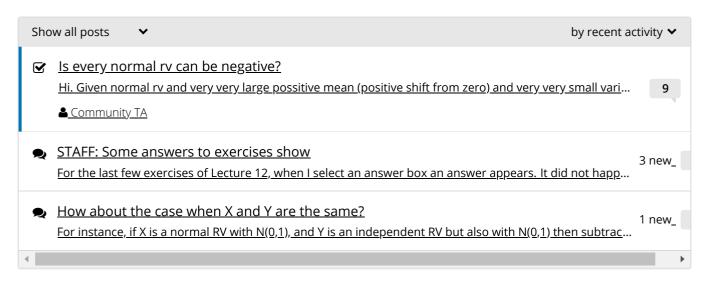| False ⌄	✔ **Answer:** False

Solution:

a) This is a fact that we are already familiar with: a linear function of a normal random variable is normal.

b) Since X and Y are independent and normal, the random variables $3X$ and $-4Y$ are also independent and normal. Since the sum of independent normals is normal, it follows that $3X - 4Y$ is normal.

c) There is no reason for this to be the case. To see this, consider an extreme case where $Y = 0$ (a degenerate case of a normal). Then the random variable $X^2 + Y$ is nonnegative, which is incompatible with having a normal distribution.

Submit	You have used 1 of 1 attempt

🛈 Answers are displayed within the problem

Discussion

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Topic: Unit 6: Further topics on random variables:Lec. 12: Sums of independent r.v.'s; Covariance and correlation / 7. Exercise: Sum of normals

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☑ **Is every normal rv can be negative?**
Hi. Given normal rv and very very large possitive mean (positive shift from zero) and very very small vari...
👤 Community TA

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💬 **STAFF: Some answers to exercises show**
For the last few exercises of Lecture 12, when I select an answer box an answer appears. It did not happ...

3 new

💬 **How about the case when X and Y are the same?**
For instance, if X is a normal RV with N(0,1), and Y is an independent RV but also with N(0,1) then subtrac...

1 new