Stat 134: Section 23

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Conceptual Review

a. What is the computational formula for covariance?

b. If X and Y are independent, what is $Cov(X, Y)$?

c. Use bilinearity of covariance to expand $Cov(aX + Y, Y + Z)$, where a is a constant.

Problem 1

Let X have uniform distribution on $\{-1, 0, 1\}$ and let $Y = X^2$. Are X and Y uncorrelated? Are X and Y independent? Explain carefully.
Ex 6.4.5 in Pitman's Probability

Problem 2

Let A and B be two possible results of a trial, not necessarily mutually exclusive. Let N_A and N_B be the number of times A and B respectively occur in n i.i.d. copies of this trial. Show that if N_A and N_B are uncorrelated, then events A and B are independent.
Ex 6.4.13 in Pitman's Probability

What is this problem asking us to show? How does this connect to $Cov(N_A, N_B)$?

Problem 3

Let S and T be random variables with variances σ^2, τ^2 respectively. Suppose $Corr(S, T) = \rho$. Find $Var(3S + 2T)$. (Hint: begin by finding $Cov(S, T)$ based on the provided information.)

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