S431 Assignment 2

Due September 10, 2017

Q1

Assume Y_1 and Y_2 are random variables, and a_1, a_2 are constants. Represent the following expressions in terms of $E(X), E(Y), var(X)$, and/or $var(Y)$.

1a

$E(a_1Y_1 + a_2Y_2)$

1b

$var(a_1Y_1 + a_2Y_2)$

1c

$var(a_1Y_1 + a_2Y_2)$ if Y_1 and Y_2 are independent.

Q2

Assume that $Y_1, Y_2, \ldots, Y_n$ are independent random variables and $a1, a_2, \ldots, a_n, c_1, c_2, \ldots, c_n$ are constants. Represent the following expressions in terms of $E(Y_i), var(Y_i)$, and/or $cov(Y_i, Y_j)$ for $i \neq j$ and $i, j = 1, \ldots, n$.

2a

$var(\sum_{i=1}^{n} a_iY_i)$

2a

$cov(\sum_{i=1}^{n} a_iY_i, \sum_{i=1}^{n} c_iY_i)$

Hint: If $Y_1, Y_2, \ldots, Y_n$ are random variables, then

- $E(\sum_{i=1}^{n} a_iY_i) = \sum_{i=1}^{n} a_iE(Y_i)$
- $var(\sum_{i=1}^{n} a_iY_i) = \sum_{i=1}^{n} \sum_{j=1}^{n} a_ia_jcov(Y_i, Y_j)$