

Covariance is linear

If a_1, \dots, a_n are constants, b_1, \dots, b_m are constants
and X_1, \dots, X_n are random variables, and Y_1, \dots, Y_m are random variables,
then

$$\begin{aligned}\text{Cov}(a_1 X_1 + \dots + a_n X_n, b_1 Y_1 + \dots + b_m Y_m) &= \sum_{i=1}^n \sum_{j=1}^m \text{Cov}(a_i X_i, b_j Y_j) \\ &= \sum_{i=1}^n \sum_{j=1}^m a_i b_j \text{Cov}(X_i, Y_j)\end{aligned}$$

In particular if all those constants are 1,

$$\text{Cov}(X_1 + \dots + X_n, Y_1 + \dots + Y_m) = \sum_{i=1}^n \sum_{j=1}^m \text{Cov}(X_i, Y_j)$$

If $i=1, j=1$ and the constants are not necessarily 1,

$$\text{Cov}(a_1 X_1, b_1 Y_1) = a_1 b_1 \text{Cov}(X_1, Y_1) \quad \text{i.e. the constant multiples of random variables can be pulled outside of a covariance.}$$