Quiz 15 : Linearity of Expectation

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This quiz does not count towards your grade. It exists to simply gauge your understanding. Treat this as though it were a portion of your midterm or final exam.

1   Independence

For the following, construct each of these examples if it is possible. If it not possible, write "impossible".

1. Construct a sample space and events X, Y so that $E[X]E[Y] = E[XY]$ but X, Y are not independent.

2. Construct a sample space and events X, Y so that $\text{var}(X + Y) = \text{var}(X) + \text{var}(Y)$, but X, Y are not independent.

2   Linearity of Expectation

Bob is throwing a biased coin p. Let X be the number of heads that he throws. Compute $\text{var}(X)$. Do not apply linearity of variance (although it is valid here). Note that we are deriving the variance for a Binomial distribution.