

Board Questions

Session #4, Sep 26th 2016

1 Variances

1. Prove: If $X \sim \text{Bernoulli}(p)$, then $\text{Var}(X) = p(1 - p)$.
2. Prove: If $X \sim \text{bin}(n, p)$, then $\text{Var}(X) = np(1 - p)$.
3. Suppose X_1, X_2, \dots, X_n are independent and all have the same standard deviation $\sigma = 2$. Let \bar{X} be the average of X_1, X_2, \dots, X_n . What is the standard deviation of \bar{X} .

2 Covariance

Flip a fair coin 3 times. Let X = number of heads in the first 2 flips, let Y = number of heads in the last 2 flips. Compute $\text{Cov}(X, Y)$.

3 More Covariance

Toss a fair coin $2n + t$ times. Let X = number of heads in the first $n + t$ flips, let Y = number of heads in the last $n + t$ flips. Compute $\text{Cov}(X, Y)$ and $\text{Cor}(X, Y)$.