Board Questions

Fourth Session, Sep 26th

1 Bernoulli RVs

1. Prove: if $X \sim Bernoullip$ then $var(X) = p(1-p)$
2. Prove: if $X \sim bin(n, p)$ then $var(X) = np(1-p)$
3. Suppose $X_1, ldots, X_n$ are independent and all have the same standard deviation $\sigma = 2$. Let $\overline{X}$ be the average of $X_1, ldots, X_n$. What is the standard deviation of X?

2 Probability Table

$X \backslash Y$	1	2	3	4	5	6
1	1/36	1/36	1/36	1/36	1/36	1/36
2	1/36	1/36	1/36	1/36	1/36	1/36
3	1/36	1/36	1/36	1/36	1/36	1/36
4	1/36	1/36	1/36	1/36	1/36	1/36
5	1/36	1/36	1/36	1/36	1/36	1/36
6	1/36	1/36	1/36	1/36	1/36	1/36

Compute $F(3.5, 4)$.

3 Computing Covariance

Flip a fair coin 3 times. Let X be the number of heads in the first two flips and Y be the number of heads in the last two flips. Compute $Cov(X, Y)$.

4 Concept Question

Toss a fair coin $2n+1$ times. Let X be the number of heads on the first $n+1$ trials and Y be the number of heads on the last $n+1$ trials.

If $n = 1000$ then $Cov(X, Y)$ is

a) 0

b) 1/4

c) 1/2

d) 1

e) more than 1

f) tiny but not 0