

Homework

This assignment is only for practice. Do not hand it in.

- (1) Let X_1, X_2, X_3 be independent Poisson variables with means $E[X_i] = 1$. Let $Y_1 = X_1 + X_2$ and $Y_2 = X_2 + X_3$.
- (a) Find the mean and variance of Y_1 .
- (b) Find the covariance between Y_1 and Y_2 .
- (2) Let X_1, X_2, X_3 be independent random variables that are all uniformly distributed over the interval $[-\frac{1}{2}, \frac{1}{2}]$. Let $Y_n = (X_1 + \dots + X_n)/n$. If l denotes the limit above, find an integer n_0 such that for all $n > n_0$,

$$P\{|Y_n - l| \geq .01\} \leq .01.$$

- (3) Suppose X is exponential with mean 10 and Y is uniform on $[10, 14]$, what is the probability $P\{X > Y\}$?
- (4) Show that if X and Y are independent then

$$E[X | Y = y] = E[X]$$

for all y .

- (5) Suppose X is a random variable with mean and variance both equal to 20. What can you say about $P\{1 \leq X \leq 40\}$?
- (6) A die is continually rolled until the total sum of all rolls exceeds 300. Estimate the probability that at least 80 rolls are necessary.
- (7) There are two misshaped coins in a box. Their probabilities for landing on their heads are .4 and .7 respectively. One of them is to be randomly chosen and flipped 10 times. Given that two of the first three flips landed on heads, what is the conditional expected number of heads in the ten flips?
- (8)