

1. If X is a binomial random variable with expected value 6 and variance 2.4, find $\mathbb{P}(X = 5)$.
2. Teams A and B play a series of games with the first team to win 3 games being declared the winner of the series. Suppose that team A independently wins each game with probability p . Find the conditional probability that team A wins
 - (a) the series given that it wins the first game.
 - (b) the first game given that it wins the series.
3. Each of the members of a seven judge panel will independently make a correct decision with probability 0.7. If the panel's decision is made by majority rule, what is the probability the panel makes the correct decision? Given that 4 of the judges agreed, what is the probability the jury made the correct decision?.
4. An insurance company needs to assess the risks associated with providing hurricane insurance. Between 1990 and 2006, Caribbean sea was hit by 22 tropical storms or hurricanes. If tropical storms and hurricanes are independent and the mean has not changed, what is the probability of having a year in Caribe with each of the following.
 - (a) No hits?
 - (b) Exactly one hit?
 - (c) More than three hits?
5. A foundry ships engine blocks in lots of size 20. Since no manufacturing process is perfect, defective blocks are inevitable. However, to detect the defect, the block must be destroyed. Thus we cannot test each block. Before accepting a lot, three items are selected and tested. Suppose that a given lot actually contains five defective items.
 - (a) Define X and calculate its distribution.
 - (b) Find $\mathbb{E}(X)$ and $\text{Var}(X)$.
 - (c) Set up the calculations needed to find $\mathbb{P}(X < 3)$.