

Math 4740 - Homework # 5

Binomial Random Variables

1. Suppose you flip a coin 15 times.
 - (a) Let X denote the number of heads that occur. What is $E[X]$?
 - (b) What is the probability that you get exactly 3 heads?
 - (c) What is the probability that you get at most 2 heads?
 - (d) What is the probability that you get at least 2 heads?
2. Consider an experiment where you roll two 6-sided dice. When the sum of the dice is a seven or an eleven we call it a success. Otherwise we call it a failure.
 - (a) Let X be the number of successes in 10 throws of the dice. Calculate $E[X]$.
 - (b) If we do this experiment 10 times, what is the probability of getting exactly 5 successes?
3. Consider the experiment where two 6-sided dice are thrown. If this experiment is done 10 times, what is the probability that a double sixes appears at least three times? A double sixes is where both dice are sixes.
4.
 - (a) Suppose you are dealt 2 cards from a standard 52-card deck. What is the probability that you get a blackjack? A blackjack is where one of the cards is an ace and the other card is either a ten, jack, queen, or king. For example, $A\heartsuit, J\spadesuit$ is an example of a blackjack.
 - (b) Suppose you repeat the above experiment 20 times in a row. What is the probability you get at least 2 blackjacks.
5. Suppose you bet on black 5 times in a row in roulette.
 - (a) Let X be the number of times that you win on black out of the five bets. Draw a picture of the probability function p of X .
 - (b) Draw a picture of the cumulative probability function F .

- (c) What is the probability that you will win at least three times out of the five bets?
- (d) Calculate $E[X]$.