

## Math 474 - Homework # 5

### Binomial Random Variables

1. 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  $E[X]$ .
  - (e) Calculate  $\text{Var}(X)$ .
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  $E[X]$  and  $\text{Var}[X]$ .
  - (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. 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?