

Math 525 - Probability

Homework 5

1. Consider the random variables X and Y we have associated to the random graph model $G(4, 1/4)$. Please compute the following:
 - (a) The probability mass function of the random variables $Y|X$ and $X|Y$.
 - (b) The probability mass functions of the random variables $\phi(X)$ and $\phi(Y)$.
 - (c) The expectations of each of the four random variables in the previous two parts. (Note: You can use a theorem and old homework to find the latter expectations.)
2. Exercises 3.7.4 and 3.7.7 on page 69 of the text.
3. Suppose the random variables $X \sim \text{Binomial}(m, p)$ and $Y \sim \text{Binomial}(n, p)$ are independent. Show the sum $X + Y \sim \text{Binomial}(m + n, p)$.
4. Suppose $X, Y \sim \text{Binomial}(m + n, p)$, and let $Z = X + Y$. Show the conditional distribution $X|Z$ is hypergeometric (cf. problem 10 on page 84 of the text).
5. Problem 40 on page 88 of the text.
6. Let $Y = e^X$ where X is the standard normal random variable. Find the pdf of Y .
7. Exercises 4.1.2 and 3 on page 91 of the text.
8. Exercises 4.3.4 and 5 on page 94 of the text.