

Math 464 - Homework 4

The exercises and problems referred to in 2-7 below are exercises and problems from the course text (Grimmett and Welsh).

1. Random variables X and Y take on the values $0, 1, 2, \dots, n$. Their joint probability mass function is

$$f_{X,Y}(j, k) = P(X = j, Y = k) = \frac{n!}{j!k!} p^j (1-p)^k$$

if $j + k = n$ and $f_{X,Y} = 0$ if $j + k \neq n$.

- a) Find the marginal probability mass functions of X and Y .
- b) Are X and Y independent?
- c) Now suppose that their joint mass function is

$$f_{X,Y}(j, k) = P(X = j, Y = k) = \frac{n!}{j!k!(n-j-k)!} p^j q^k (1-p-q)^{n-j-k}$$

when $j + k \leq n$ and it is zero when $j + k > n$. Here p and q are positive with $p + q < 1$. Now find the marginal distributions of X and Y .

2. Exercise 4 in Chapter 3.
3. Problem 4 in Chapter 3.
4. Exercise 3 in Chapter 4.
5. Exercise 4 in Chapter 4.
6. Exercise 6 in Chapter 4.
7. Exercise 7 in Chapter 4.