**Conditional Probability Mass Function**

Recall that



Assume that  to be the observation of a particular value of random variable, then we can write the conditional probability mass function of  as

.



Let’s take a look at the law of total probability in the chapter 1

For an event space  with  for all 



As we can see from the above equation, a random variable  resulting from an experiment with event space  has PMF



1. For any 
2. 
3. For any event , the conditional probability that  is in the set  is



**Conditional Expected Value**

The conditional expected value of random variable  given condition  is

.

For a random variable  resulting from an experiment with event space,



Proof: recall the equation 



Ex 2.39] The length of a fax  has the following PMF



Suppose the company has two fax machines, one for faxes shorter than five pages and the other for faxes that have five or more pages.

1. What is the PMF of fax length in the second machine?
2. Find the conditional expected value
3. Find conditional variance
4. Find conditional standard deviation for the long faxes.















The binomial random variable  has PMF



a) Find 1st moment and 2nd moment.

b) Find the, standard deviation of .

c) Find.

d) Find  where the condition.

e) What is?

f) What is?

a)





b)





c) 

d)





e)



f)



so

