Wednesday: September 2, 2020 L4 HW: pg. 68, #’s 110, 111

Math 360 pg. 72, #’s 129, 134

Review

*  , 
*  ( if *A* and *B* are independent)
*  ( *A* and *B* mutually exclusive)
* 

Examples

1. In a survey, 70% likes cats and 60% likes dogs, and everyone in the survey likes at least one of the animals. What is the probability that a randomly chosen person in this survey likes dogs but not cats?
2. You are given and . Determine *P(A*).
3. ,  and . Find .
4. Urn A contains 2 white marbles and 2 black marbles. Urn B contains 2 white marbles and 3 black marbles. An urn is chosen at random and a ball is randomly selected from the urn. Find the probability that a black marble is chosen.

Example:

Of the voters in a city, 40% are Republicans and 60% are Democrats. Of the Republicans, 35% favor the bond issue while 70% of the Democrats favor the bond issue. What percent of the city favor the bond issue?

Example 2.19:

Two applicants are randomly selected for a job from among five who have applied for a job. Find the probability that exactly one of the two best applicants is selected for the job.

Example 2.20:

It is known that a patient with a disease will respond to treatment with probability equal to 0.9 . If three (independent) patients with the disease are treated, Find the probability that at least one will respond.

Section 2.9 - 2.10 Bays Rule

Def. 2.11

A collection of sets  is said to be *a partition* of *S*, if

1. 
2.  for  (ie, are mutually exclusive)

Then any set *A* can be written as: 

Theorem 2.8

Assume that  is a partition of *S*, such that , for *i* = 1, 2, …,*k*. Then for any event *A*



Proof:



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Theorem 2.8 **Bayes Rule**

Assume that  is a partition of *S*, such that , for *i* = 1, 2, …,*k*. Then



Examples:

1. Suppose you have three bowls with marbles in them. The first bowl has 2 red and 4 white, the second bowl has 1 red and 2 white, and the third bowl has 5 red and 4 white. In this game, you first select a bowl at random then randomly select a marble from the bowl selected. The probability of selecting bowl is as follow: 
   1. Find the probability of selecting a red marble.
   2. Suppose that Fred picked a red marble, find the probability that this marble came from bowl 1.
2. Let D be the event that a person has a disease.

Let E be the event that the test is positive.

Suppose that  . Find the probability that a person has the disease given that the test is positive, i.e. find.