

Finite Math, MATH 1100-R07

Fall 2022

Written Homework 2

Due Monday, October 3

1. You are given the following data regarding the probabilities of two events E, F :

	F	F'
E	0.2	0.3
E'	0.4	0.1

- (a) Compute $P(E), P(F), P(E \cup F), P(E' \cup F')$ and $P(E|F')$.
- (b) Are E and F independent?
2. Suppose 80% of people like peanut butter, 89% like jelly, and 78% like both. Given that a randomly sampled person likes peanut butter, what's the probability that he/she also likes jelly?
3. Suppose 21% of the population are 62 or over, 29% of those over 62 or over have loans, and 55% of those under 62 have loans.
- (a) Find the probability that a person is 62 or over and has a loan.
- (b) Find the probability that a person has a loan.
- (c) Are the events that a person is 62 or over and that the person has a loan independent?
4. A genetic test is used to determine if people have a predisposition for thrombosis, which is the formation of a blood clot inside a blood vessel that obstructs the flow of blood through the circulatory system. It is believed that 3% of people actually have this predisposition. The genetic test is 99% accurate if a person actually has the predisposition, meaning that the probability of a positive test result when a person actually has the predisposition is 0.99. The test is 98% accurate if a person does not have the predisposition. What is the probability that a randomly selected person who tests positive for the predisposition by the test actually has the predisposition?
5. Edison Research gathered exit poll results from several sources for the Wisconsin recall election of Scott Walker. They found that 53% of the respondent voted for Walker. Additionally, they estimated that of those who voted for Walker, 37% had a college degree, while 44% of those who voted against him had a college degree (source: New York Times). Suppose that we randomly sampled a person who participated in the exit poll and found that he had a college degree. What is the probability that he/she voted for Walker?
6. In the 2012 presidential election, over 126 million people voted, of which 46% were male and 54% were female. Of the male voters, 45% voted for Obama, 52% voted for Romney and 3% for third party candidates. Of the female voters, 55% voted for Obama, 44% voted for Romney and 1% for third party candidates. (source: Huffington Post).

- (a) Find the percentage of voters who voted for Obama.
 - (b) Find the probability that a randomly selected voter was male and voted for Obama.
 - (c) Find the probability that a randomly selected voter for Obama was male.
7. An insurance company sells two types of policy for car insurances, which we call type A and type B. The clients are then divided into two categories: over 50 years of age and under 50 years of age. The company knows that:
- 40% of the clients who purchased policy A is over 50.
 - 80% of the clients who purchased policy B is under 50.
 - 26% of the clients are over 50.

A client over 50 is chosen. Find the probability that the client purchased policy A.

[Hint: to solve this problem, proceed as follows. Draw a tree diagram and set $P(\text{type A}) = x$. Find an equation for x and solve it. You then will have all the data to answer the question.]

8. The table below shows the distribution of books on a bookcase.

	Hadcover	Paperback	Total
Fiction	13	59	72
Nonfiction	15	8	23
Total	28	67	95

Suppose you randomly draw 3 books without replacement. Find the probability of drawing the following:

- (a) 3 Fiction books.
- (b) At least one Hardcover book.