

Tutorial 2.1 – Discrete Probability

Question 1 [10 Marks]

i) Let A and B be events in a sample space S such that $P(A) = 0.53$, $P(B) = 0.48$ and $P(A \cap B) = 0.22$. Find the following probabilities

- a) $P(A \cup B)$
- b) $P(A \cap B')$
- c) $P(B')$

ii) Find the probability that a 4 is obtained on one of the dice in a throw of two dice, given that the sum of digits on the upper faces is 7.

iii) In a high school class, 35% of the students take Spanish as a foreign language, 15% take French as a foreign language, and 40% take at least one of these languages. What is the probability that a randomly chosen student takes French given that the student takes Spanish?

Question 2 [10 marks]

i) Three friends and seven other people are randomly seated in a row. What is the probability that the three friends will sit next to each other?

ii) A college has 10 (non-overlapping) time slots for its courses, and blithely assigns courses to time slots randomly and independently. A student randomly chooses 3 of the courses to enroll in. What is the probability that there is a conflict in the student's schedule?

iii) A committee of 5 students is selected a random from a group consisting of 10 boys and 5 girls. What is probability the committee has exactly 3 boys?

Question 3 [10 marks]

Suppose that 8% of the patients tested in a clinic are infected with bird flu. Furthermore, suppose that when a test for bird flu is given, 98% of the patients infected with bird flu test positive and the 3% of the patients not infected with bird flu test positive. What is the probability that:

- a) A patient testing positive for bird flu with this test is infected with it?
- b) A patient testing positive for bird flu with this test is not infected with it?
- c) A patient testing negative for bird flu with this test is infected with it?
- d) A patient testing negative for bird flu with this test is not infected with it?

Question 4 [10 Marks]

In a study of pleas and prison sentences, it is found that 45% of the subjects studied were sent to prison. Among those sent to prison, 40% chose to plead guilty. Among those not sent to prison, 55% chose to plead guilty.

- i) If one of the study subjects is randomly selected, find the probability of getting someone who was not sent to prison.
- ii) If a study subject is randomly selected and it is then found that the subject entered a guilty plea, find the probability that this person was sent to prison.
- iii) If one of the study subjects is randomly selected, it is found that the subject is entered a guilty plea, find the probability that this person was not sent to prison.
- iv) If a study subject is randomly selected find the probability of getting someone who was chose to plead guilty.

Question 5 [8 Marks]

A random sample of 200 adults are classified by gender and education level, as below

No	Education	Male	Female
1	Elementary	38	45
2	Secondary	28	50
3	College	22	17

If a person is picked at random from this group, find the probability that

- a) The person is a male.
- b) The person has elementary education among female.
- c) The person is a male, given that the person has a secondary education.
- d) The person does not have a college degree, given that the person is female.

Question 6 [10 Marks]

Three different suppliers, X , Y and Z provide produce for a grocery store. Twelve percent of produce from X is superior grade, 8% of produce from Y is superior grade and 15% of produce from Z is superior grade. The store obtains 20% of its produce from X , 45% from Y and 35% from Z .

- a) What is the probability that a produce in the grocery store is obtain from supplier Y ?
- b) If a piece of produce is purchased, what is the probability that it is superior grade?
- c) If a piece of produce in the store is the superior grade, what is the probability that is from Z ?
- d) What is the probability that the superior grade of produce in the store is from supplier X ?