SCHOOL OF COMPUTING
Faculty of Engineering

SCSI1013: Discrete Structure
[2019/2020 - Semester 1]
Due Date: 1st December 2019

Tutorial 2.2 – 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*?