UNIVERSITI TEKNOLOGI MALAYSIA

SCSI2143 / SECI2143

Probability & Statistical Data Analysis

2019/2020 – Semester 2

ASSIGNMENT 2 (5%)

Due date: 24 March 2020

Answer all questions below

Question 1 – 7M

a) An agricultural corporation claims that 90% of the pineapples shipped out are ripe and ready to eat. Find the probability that among 18 pineapples shipped out, all 18 pineapples are ripe and ready to eat.

b) A tourism transportation company in a small town runs a fleet of 20 vans, which are all aging. Assume that the probability of some type of maintenance being required, for each van each day is 0.2, and that they will or will not require maintenance independently. If Y is the number of vans that require maintenance on a given day:

   i. What is the mean for Y?

   ii. What is the variance for Y?

c) An expert shot hits a target 95% of the time. What is the probability that the expert will miss the target for the first time on the fifteenth shot?

Question 2 – 8M

Table 2 below shows the number of hospitalizations for cardiovascular disease, by age group, for one year.

Age group (year)	Number
0-19	60
20-39	150
40-49	300
50-59	580
60-69	678
70-79	1288
80 and over	1378

One of these case records is selected at random. Find the probability that the selected patient was

a) In the age of 50s
b) Less than 50 years old
c) Between 40 and 69 years old, inclusive.
d) At least 70 years old.

Question 3 – 10M

In a Japanese restaurant, an average of 3 out of every 5 customers ask for plain water with their meal. A random sample of 10 customers is selected. Let X equals to the number of customers that ask for plain water. Assume each trial is independent.

a) Find the probability that exactly 6 ask for plain water with their meal.
b) What is the probability that less than 9 customers ask for plain water with their meal?
c) A second random sample of customers is selected. What is the probability that the first who to ask for plain water is the fourth customer?

Question 4 – 10M

a) A test has been devised to measure a student's level of motivation during 1st year in university. The motivation scores on this test are approximately normally distributed with mean of 25 and a standard deviation of 6. The higher the score the greater the motivation to do well in university.

    i. What percentage of students taking this test will have score below 10?
    ii. What percentage of students taking this test will have scores between 16 and 31?
    iii. Aishah is told that 33% of students taking the test have higher motivation score that she does. What was Aishah's score?

b) A package delivery service divides their packages into weight classes. Suppose that packages in the weight class of 14 to 20 kg are uniformly distributed, meaning that all weights within that class are equally likely to occur. Let X denote the weight of a package.
    i. Write the density function, f(x) of X.
    ii. Find the probability that a package weights at least 15 pounds.

Question 5 – 15M

a) 60% of all computers sold by a large computer retailer are laptops and 40% are desktop models. The type of computer purchased by each of the next 12 customers will be recorded. Given a random variable x as number of laptops purchased among these 12 customers, determine
    a. Either x is a binomial random variable or geometry random variable.
    b. The probability that exactly four computers are laptops.
    c. The probability that between four and seven (inclusive) are laptops.
    d. Given a random variable x as the number of desktops purchased among these 12 customers, determine the probability that exactly two computers are desktops.

b) From the experience it is known that 3% of accounts in a large company accounting population are in error.
    a. What is the random variable x representing?
    b. What is the probability that 5 accounts (x=5) are audited before an account in error is found?
    c. What is the probability that the first account in error occurs is the first five accounts (x<=5) audited?

Question 6 – 5M

Smart phones have been one of the most important part in our daily life. The length of working time for a smart phone before it needs to be charged, X is normally distributed with a mean of 20 hours and a standard deviation of 2 hours.

a) What is the probability that a phone will work for at least a day without charging?
b) You are going to attend a 2-hour meeting right now and your phone has been used for 25 hours since the last charge. What is the probability that your phone will still work throughout the meeting without charging?