



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : STATISTICS AND PROBABILITY I
COURSE CODE : BWB 10103
PROGRAMME CODE : BWQ / BWA
EXAMINATION DATE : DECEMBER 2017/ JANUARY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

Q1 (a) Classify the following random variables whether it is discrete or continuous.

- (i) The number of carrots used to bake a carrot cake.
- (ii) The amount of milk produced yearly by a cow.
- (iii) The number of eggs laid each month by a hen.
- (iv) The weight of grain produced per acre.
- (v) The right temperature to bake a perfect loaf.

(5 marks)

(b) Based on **Figure Q1(b)** below, answer the following questions.

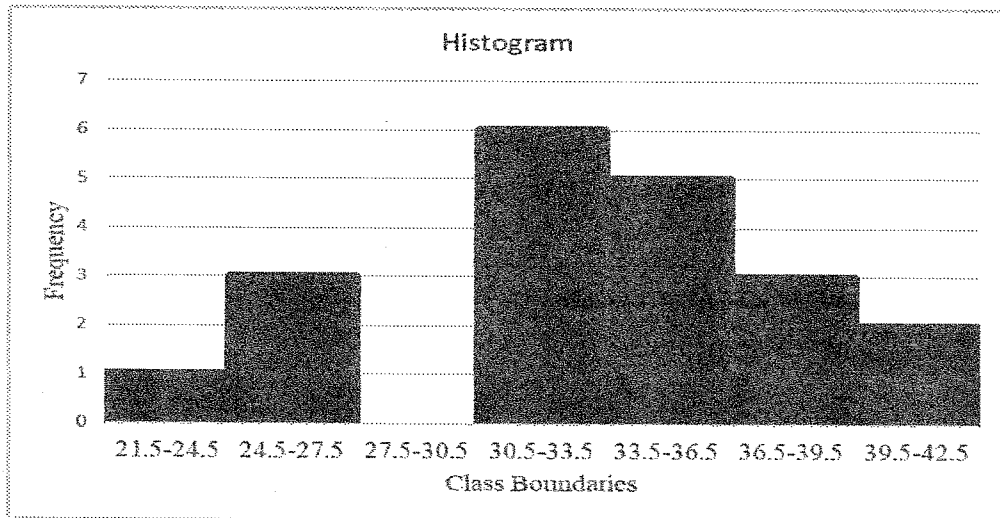


Figure Q1(b): Histogram

(i) Construct a frequency distribution; include class limits, class frequencies, midpoints and cumulative frequencies.

(5 marks)

(ii) Sketch a frequency polygon.

(3 marks)

Q2 (a) Explain the difference between percentage and a percentile.

(2 marks)

(b) In attempt to determine necessary dosages of a new drug (HDL) used to control sepsis, assume you administer varying amounts of HDL to 40 mice. You create four groups and label them low dosage, moderate dosage, large dosage and very large dosage. The dosages also vary within each group. After the mice are injected with the HDL and the sepsis bacteria, the time until the onset of sepsis is recorded. Your job as a statistician is to effectively communicate the results of the study.

(i) What measures of position could be used to help describe the data results?

(1 mark)

(ii) If 40% of the rats in the top quartile survived after the injection, how many mice would that be?

(1 mark)

- (c) A survey of bookstores shows that the average number of magazines carried is 56, with a standard deviation of 12. The same survey showed that the average length of time each store had been in business was six years, with a standard deviation of 2.5 years. Which is more variable, the number of magazines or the number of years? Explain.

(3 marks)

- Q3** (a) Suppose that a first-year student of BWA and BWQ is leaving on a field trip to Endau, Mersing by bus. M is the event that they will experience a mechanical problem, T is the event the they will receive a summon for committing a traffic violation, and V is the event that they will arrive at campsite with no vacancies. Referring to the Venn diagram in **Figure Q3(a)**, state in words the events represented by the following regions:

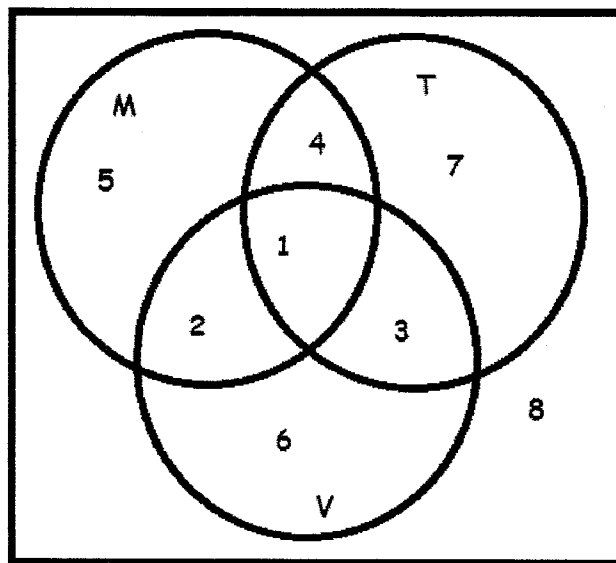


Figure Q3(a): Venn diagram with the regions (1-8)

- (i) Regions 5,
 - (ii) Regions 3,
 - (iii) Region 5, 2 and 6 together,
 - (iv) Region 4 and 7 together.
- (10 marks)
- (b) One bag contains four green flowers and three yellow flowers, and a second bag contains three green flowers and five yellows. One flower is drawn from the first bag and placed unseen in the second bag.
- (i) Construct a tree diagram to illustrate the problem. (6 marks)
 - (ii) What is the probability that a yellow would be drawn from the second bag? (2 marks)
 - (iii) What is the probability that a green flower would be drawn from the first bag and a yellow from the second bag? (1 marks)

- (iv) What is the probability that flowers with the same colour would be drawn from both bags? (2 marks)
- (v) **ONE (1)** ball is drawn at random from one of the bags and it is found to be green ball. Find the probability that it was drawn from the first bag. (3 marks)

Q4 (a) A talk radio station has four telephone lines. If the host is unable to talk during a commercial, or is talking to a person, the other callers are placed on hold. When all lines are in use, others who are trying to call in get a busy signal. The probability that 0, 1, 2, 3 or 4 people will get through is shown in **Table Q4(a)** below. Answer the following questions.

Table Q4(a): The probability distribution

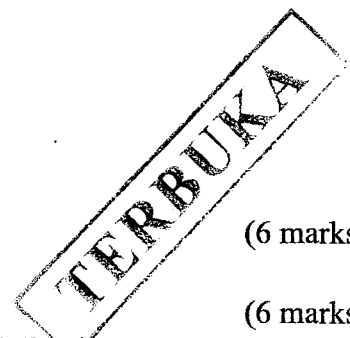
X	0	1	2	3	4
$P(X)$	0.18	0.34	0.23	0.21	0.04

- (i) Find the mean, variance and standard deviation for the distribution. (5 marks)
 - (iii) Calculate $E(5X+4)$. (2 marks)
 - (iv) Find $Var(6X-5)$. (2 marks)
- (b) Given a probability distribution function for continuous random variables X as below:

$$f(x) = \begin{cases} ax^2 & 0 < x < 1 \\ \frac{x+1}{4} & 1 < x < 2 \\ \frac{1}{4} & 2 < x < 3 \end{cases}$$

Answer the following questions.

- (i) Find the value of a . (6 marks)
- (ii) Calculate $P(0.5 < x < 1.75)$. (6 marks)
- (iii) Construct a cumulative distribution function of $X, F(X)$. (10 marks)



- Q5** (a) It is known that 35% of mice inoculated with a serum are protected from a certain disease. If ten mice are inoculated, find the probability that;
- (i) none contracts the disease,
 - (ii) fewer than two contract the disease,
 - (iii) between two and eight contract the disease.
- (9 marks)
- (b) A survey found that people keep their microwave oven an average of 3.2 years. The standard deviation is 0.56 year. If a person decides to buy a new microwave oven, find the probability that he or she has owned the old oven for the following amount of time. Assume that the variable is normally distributed.
- (i) Less than 2.4 years.
 - (ii) Between 1.6 and 3.7 years.
 - (iii) More than 3.8 years.
- (9 marks)
- (c) The midterm test of a subject has 80 questions, each question with four possible answers of which only one answer is correct. Find the probability that the student obtains from 25 to 30 answers are correct.
- (7 marks)

– END OF QUESTIONS –

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