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UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE

ALLIED HEALTH SCIENCES DEGREE PROGRAMME

FIRST BPHARM PART II EXAMINATION - NOVEMBER 2015

PH 1262 - BIOSTATISTICS I

INDEX NO: .....

TWO HOURS

INSTRUCTIONS

- No paper should be removed from the examination hall.
- Marks will be deducted for illegible hand writing.
- Do not use any correction fluid.
- Calculators are allowed.
- **Answer all Questions.**

1.

A high-volume drug screen was designed to find compounds that reduce low-density lipoproteins (LDL) cholesterol in rats. The treatment group of rats was fed a special diet mixed with a drug compound over a specified period of time. The placebo group of rats was fed the same special diet for the same period of time but without the drug compound. Following are the plasma LDL levels for the two groups:

Placebo
53 56 64 68 66 76 71 80 70 72 74

Treatment
40 31 50 48 44 38 64

(a) Find the mean value of LDL in each group.
(b) Find the five number summary values and IQR of LDL levels in each group.
(c) Sketch boxplots for each group in a graph (use the same graph for both groups)
(d) Discuss the shapes of the distributions of LDL in each group.
(e) Assess the effectiveness of the treatment in reducing the LDL cholesterol.

(25 marks)

2.

(a) In a survey of hospital patients, it was shown that the probability that a patient has high blood pressure given that he or she is diabetic was 0.85. If 10%of the patients are diabetic and 25%have high blood pressure:

(i) What is the probability that a patient has both diabetes and high blood pressure?
(ii) Are the conditions of diabetes and high blood pressure independent?

(10 marks)

(b) The incidence of cold among 279 French skiers who were given either vitamin C or placebo is given below.

Treatment	Cold	No Cold
Vitamin C	17	122
Placebo	31	109

(i) What percent of the vitamin C group had cold?
(ii) What percent of the placebo group had cold?
(iii) Based on the percentages do you think that vitamin C was beneficial in reducing the incidence of colds among these skiers? Explain.

(15 marks)

3.

(a) The probability that a patient recovers from a delicate heart operation is 0.8. What is the probability that
(i) exactly 2 of the next 3 patients who would undergo the operation would survive?
(ii) all of the next 3 patients who would undergo this operation would survive?

(10 marks)

(b) Suppose the number of admissions to the emergency room at a small hospital follows a Poisson distribution, but the incidence rate changes with the day. On a weekday there are, on average, two admissions per day, while on a weekend there is, on average, one admission per day.

(i) What is the probability that there is at least one admission on a Wednesday?
(ii) What is the probability that there is at least one admission on a Saturday?
(iii) Calculate the probability that there will be exactly ten admissions for an entire week.

(15 marks)

4. A machine producing vitamin E capsules operates so that the actual amount of vitamin E in each capsule is normally distributed with a mean of 5 mg and a standard deviation of 0.05 mg.

(a) What is the probability that a randomly selected capsule contains

(i) less than 4.9 mg of vitamin E?

(ii) at least 5.15 mg of vitamin E?

(b) What are the quartiles (the 25% and 75% values) of this distribution?

(c) What is the inter quartile range in milligrams for the amount of vitamin E in a capsule?

(d) How many capsules can we expect to find with more than 5.1 mg of vitamin E in a lot of 1000 capsules?

(25 marks)