

106

4



UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE

ALLIED HEALTH SCIENCE DEGREE PROGRAMME

FIRST B PHARM . PART II EXAMINATION- MARCH 2012

PH 1262 BIostatISTICS I

DATE : 14th March 2012

INDEX NUMBER:

TIME : 9.00 a.m.- 10.00 a.m

INSTRUCTIONS

- Answer all questions.
- No paper should be removed from the examination hall.
- Marks will be deducted for illegible hand writing.
- Do not use any correction fluids.
- Answer each question in a separate book.

1. Medical case histories that different illnesses may produce identical symptoms. Suppose that a particular set of symptoms, denoted by H , occurs only when any one of three illnesses, I_1, I_2 or I_3 , occurs. Assume that the simultaneous occurrence of more than one of these illnesses is impossible and that

$$P(I_1) = 0.01, \quad P(I_2) = 0.005, \quad \text{and} \quad P(I_3) = 0.02.$$

The probabilities of developing the set of symptoms H , given each of these illnesses, are known to be

$$P(H | I_1) = 0.9, \quad P(H | I_2) = 0.95, \quad \text{and} \quad P(H | I_3) = 0.75.$$

Assuming that an ill person exhibits the set of symptoms, H , what is the probability that the person has illness I_1 ?



2. Let X be a discrete random variable that represents the number of diagnostic services a child receives during a clinic visit to a pediatric specialist; these services include procedures such as blood tests and urinalysis. The probability distribution for X appears below.

x	$P(X=x)$
0	0.671
1	0.229
2	0.053
3	0.031
4	0.010
5 ⁺	0.006
Total	1.000

- 2.1. What is the probability that a child receives exactly three diagnostic services during a clinic visit to a pediatric specialist?
- 2.2. What is the probability that he or she receives
- 2.2.1. at least one service?
- 2.2.2. four or more services?
- 2.3. What is the probability that the child receives exactly three services given that he or she receives at least one service?
3. Assume that birth weights are normally distributed with a mean of 3200g and a standard deviation of 600g.
- 3.1. Find the probability of **low-birth weight** child, where low-birth weight is defined as $\leq 2500g$.
- 3.2. Find the probability of **very low-birth weight** child, where very low-birth weight is defined as $\leq 2000g$.
- 3.3. Assuming that successive deliveries by the same woman have the same probability of being **low-birth weight**, what is the probability that a woman with exactly 3 deliveries will have 2 or more **low-birth weight** deliveries?
4. In a particular country, the number of cases of tetanus reported during a single month has a Poisson distribution with parameter $\lambda = 4.5$.

What is the probability that

- 4.1. exactly one case of tetanus will be reported during a given month?
- 4.2. at most two cases of tetanus will be reported?
- 4.3. four or more cases will be reported?

