

**Ollscoil na hEireann Gaillimh.**

**National University of Ireland Galway**

**MASTER OF MEDICAL SCIENCE  
DEGREE EXAMINATION**

**APPLIED STATISTICS**

**Spring. 2000**

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**Candidates are required to have an electronic calculator and a copy of a statistical text with tables such as Swinscow: candidates are also permitted to have lecture notes, reprints etc. in the examination hall without restriction.**

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**Answer any four questions. Duration of examination 3 hours.**

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### Question No.1.

### Parametric Data.

A sample of 11 patients with chronic disease have the following Haemoglobin levels in grams per 100 ml.: 11.3, 10.7, 12.5, 10.8, 9.6, 11.6, 8.2, 10.5, 10.0, 13.0, 7.4.

- a). Determine the Mean, the Standard Deviation, the Standard Error of the Mean and the 95% Confidence Interval of the Mean for the sample; explain what each expression signifies.
- b). in a second sample of 13 patients, the mean Haemoglobin levels in grams per 100 ml. is 11.6 and the common Standard Deviation of the two samples is 1.5 grams. What is the statistical significance of the difference? Explain what this means.
- c). Determine the Confidence Interval of the Difference between the two means. Explain how this differs from the statistical significance in b). above. What are the arguments for using one procedure rather than the other in the evaluation of the results of medical research?
- d). Explain the term "Parametric Data".

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### Question No.2

### Clinical trials.

Describe and discuss the following topics in the appended paper "Helping people to stop smoking" BMJ, 291:1538-39 By Clavel, F. et al.

- a). The design and plan of this paper.
- b). How was randomization effected?  
Why is randomization necessary?
- c). Did the samples studied represent the population? What is the relationship between sample and population in clinical trials?
- d). The authors report that  $\alpha = 5\%$   $\beta = 10\%$ .  
Explain the meaning and importance of these terms.  
How would you determine these values?

Question No.3

Distribution of discrete variables.

In the appended paper "Helping people to stop smoking" BMJ,291:1538-39 By Clavel, F. et al. certain results of tests of statistical significance are presented.

- a). Calculate the significance values for the one month data for the three samples.
- b). What is the Yates' correction? Should it be employed with this data.
- c). How should appropriate statistical tests be selected for the evaluation of the results of clinical trials?

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Question No 4.

Nonparametric statistics.

12 matched pairs of agitated patients were treated with Diazepam and a new sedative agent (NSA). The outcome measured was the time in hours until the calming was achieved.

The results are recorded within the brackets for each matched pair-- the time in hours to achieve calming for the patient treated with Diazepam first and the time in hours to achieve calming for the patient treated with NSA second.

(2,7) (5,10) (6,10) (8,12) (9, 5) (2,6) (3,5) (5,6) (6,11) (7,4) (9,2) (2,8)

- a). Assuming the data is nonparametric, calculate the statistical significance of the difference between the two samples.  
Is the difference clinically significant?
- b). Under what circumstances should tests for matched/paired data be used?
- c). List statistical tests employed in the analysis of matched/ paired data.
- d). What are the advantages and disadvantages of trials using matched pairs?
- e). How is randomization effected in matched pair trials?