# UNIVERSITY OF NEWCASTLE UPON TYNE

## **Premedical course**

### **MOCK Examination I**

2 hours

### Answer all questions

### 1. Write short notes on

- a) methods of graphical representation of the distribution of a continuous variable;
- b) the relative merits of hypothesis testing and confidence intervals;
- c) Simpson's paradox.

[15 marks]

2. A case-control study was carried out to see whether children with peptic ulcer differed genetically from other children. The following results were obtained in relation to the Rhesus D blood group:

	Rh+	Rh-	
Peptic ulcer Control	36	6	42
Control	28	12	40
	64	18	82

What proportion of a) children with peptic ulcer, b) control children are Rhesus positive?

For the table			
	Factor present	Factor absent	
Cases Controls	a c	b d	$n_1 \\ n_2$
	n <sub>3</sub>	$n_4$	N

the odds ratio is  $\hat{\psi} = ad/bc$  and 95% confidence limits for  $\hat{\psi}$  may be obtained through the formula for the standard error of  $\log \hat{\psi}$  which is  $\sqrt{1/a + 1/b + 1/c + 1/d}$ . Calculate and interpret the odds ratio, with its 95% confidence limits, for the table given.

[15 marks]

3. Use the following MINITAB output (some of which may be inappropriate) to analyse and interpret data from a study which tries to establish whether there is a relationship between a croquet player sustaining an injury and various potential risk factors. Describe critically what the analyst has or has not done. Some of the MINITAB output has been deleted for clarity.

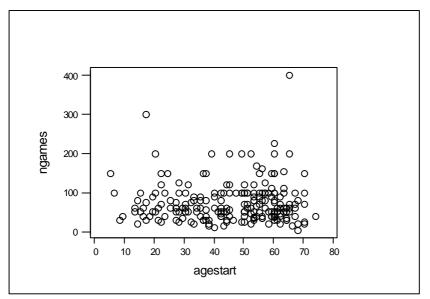
The variable 'anywrist' has value 1 if the subject has reported at least one sufficiently serious injury to hand, wrist or arm, and 0 otherwise; 'agestart' is the age (in years) the subject began to play, 'ngames' is the average number of games he or she played per season when most active; 'sex' is coded 1 for males and 2 for females.

MTB > Describe 'agestart' 'ngames'; SUBC> By 'anywrist'. SEMEAN anywrist N MEAN MEDIAN STDEV agestart 0 138 47.97 53.00 16.09 1.37 76 41.01 42.00 16.06 1 71.45 60.00 50.99 ngames 0 138 1 76 80.76 72.50 51.54 MTB > TwoT 95.0 'agestart' 'anywrist'; SUBC> Alternative 0; SUBC> Pooled. TWOSAMPLE T FOR agestart N 76 MEAN STDEV SE MEAN anywrist 41.0 16.1 1.8 1 0 138 48.0 16.1 1.4 95 PCT CI FOR MU 1 - MU 0: ( -11.5, -2.4) TTEST MU 1 = MU 0 (VS NE): T= -3.03 P=0.0028 DF= 212 POOLED STDEV = 16.1 MTB > TwoT 95.0 'ngames' 'anywrist'; SUBC> Alternative 0; SUBC> Pooled. TWOSAMPLE T FOR ngames MEAN anywrist N 1 76 STDEV SE MEAN 80.8 51.5 5.9 0 138 71.4 51.0 4.3 95 PCT CI FOR MU 1 - MU 0: ( -5.1, 23.7) TTEST MU 1 = MU 0 (VS NE): T= 1.27 P=0.20 DF= 212 POOLED STDEV = 51.2 MTB > Table 'sex' 'anywrist'; SUBC> Counts; SUBC> ChiSquare. COLUMNS: anywrist ROWS: sex 0 1 ALL 1 110 59 169 2 28 17 45 76 ALL 138 214 CHI-SQUARE = 0.128 WITH D.F. = 1 MTB > Plot 'ngames'\*'agestart'; SUBC> Symbol.

1.84

4.34

5.91



MTB > Regress 'ngames' 1 'agestart'.								
The regression equation is ngames = 71.4 + 0.073 agestart								
Predictor Constant agestart	Coef 71.42 0.0734	10.38						
s = 51.37	R-sq	= 0.1%	R-sq(adj) =	0.0%				
Analysis of Variance								
SOURCE Regression Error Total	DF 1 212 213	SS 308 559401 559709	MS 308 2639	F 0.12	р 0.733			

[18 marks]

4. Discuss some of the problems you might encounter in writing the protocol for a clinical trial comparing two analgesics for their efficacy in relieving pain after extraction of wisdom teeth.

[12 marks]