
Question one: 20 marks

a) Define with illustrations the following terms as used in research methodology:

- i. Null hypothesis.
- ii. Heteroscedasticity.
- iii. Confounding relationship.
- iv. Covariance.
- v. Autocorrelation.
- vi. P-value.
- vii. Type I error.
- viii. Extraneous variables.
- ix. Principal component analysis.
- x. Bibliography.

(10 marks)

- b) A researcher is concerned that there might be a relationship between watching "Celebrity Come Dancing" and cortical atrophy. The researcher obtains the brains of 30 inmates from a residential home. He takes a standard-sized slice of cortex from each brain and measures how many synapses it contains. He correlates this measure with a record of how many episodes of "Celebrity Come Dancing" were viewed by each inmate. Here is some of the SPSS output from this study.

Correlations

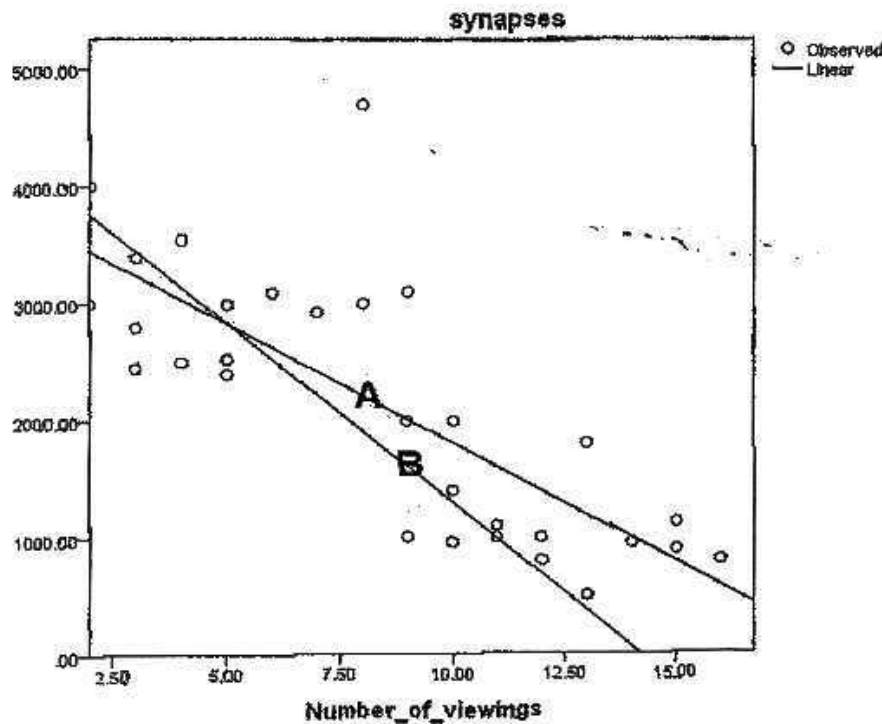
		Number_of_viewings	synapses
Number_of_viewings	Pearson Correlation	1	-.772**
	Sig. (2-tailed)		.000
	N	30	30
synapses	Pearson Correlation	-.772**	1
	Sig. (2-tailed)	.000	
	N	30	30

Model Summary and Parameter Estimates

Dependent Variable: synapses

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.597	41.395	1	28	.000	3865.010	-205.403

The independent variable is Number_of_viewings.



- i. A correlation test has been performed on these data. What does it tell us about the relationship between the number of viewings of "Celebrity Come Dancing" and the number of synapses?
- i. How many degrees of freedom does this Pearson's correlation have?
- i. Which of these equations correctly describes the regression line that SPSS would fit to the scatter-plot?
- v. What is the value of the intercept in the regression equation?
- v. Approximately how much of the variability in number of synapses is accounted for by its relationship with viewing "Celebrity Come Dancing"?
- i. If a person had watched 5 episodes of "Celebrity Come Dancing", approximately how many synapses would you predict them to have?

Question three: 20 marks

a) State the importance of the following items in a research proposal/thesis. Give two points in each case.

- i. Abstract.
- ii. Literature review.
- iii. Methodology.
- iv. Sample size computation.
- v. Recommendations.

(5 marks)

b) You are given a brief description of a study and some data; you have to choose the appropriate test. Unless stated otherwise, assume the data are normally distributed and show homogeneity of variance. There are 10 questions, each worth 1 mark. For each question write the letter corresponding to the correct test (i.e. A for Wilcoxon, B for Friedman, etc

A. Wilcoxon.	E. Spearman's rho.
B. Friedman.	F. Pearson's r.
C. Mann-Whitney.	G. Chi-Squared.
D. Kruskal-Wallis.	

- i. A researcher is interested in whether there is a relationship between daily temperature and the amount of time that students study. She measures the temperature each day for six months, and the mean number of hours spent in the library by a group of students. What test is required to test the hypothesis that study time is related to temperature?

- ii. A study was performed to examine the effects of allergies on mood. One group of participants was allergy-free; another group suffered from severe hay fever; a third group suffered from eczema; and a fourth group had gluten intolerance. A therapist rated the mood of each participant on a 100-point scale. Which statistical test should the researchers use to see if allergies affect mood?
- iii. A study was performed to investigate the effects of alcohol on people's impulsivity. Three groups of participants were compared. One group had water; one group had 1 pint of beer; and the third group had one pint of vodka. Each subject's impulsivity was assessed by a questionnaire that yielded a score out of 50. Which statistical test should the researchers use to test if alcohol affects impulsivity?
- iv. A researcher is interested in comparing the effectiveness of four different scuba diving courses. He assembles a boat-full of divers (twenty from each course), and takes them to a nearby barrier reef. Each diver makes one dive, in which he attempts to stay safely below the water for 40 minutes. The researcher then measures the number of divers from each course who successfully return to the surface. Which test should the researcher use in order to see if there is a significant?
- v. In response to claims that A-levels are easier now than they were 20 years ago, a group of current sixth-formers are given two English exams, one a copy of the 1980 A-level paper, and the other a copy of the 2005 A-level paper. Each student provides a mark for each exam, out of 100. Their scores for the 1980 paper are heavily skewed. Which statistical test should be used to test the hypothesis that English exams used to be harder than they are nowadays?
- vi. A researcher wants to find out if there is a relationship between length of service in academia and levels of obsession. The obsession level of each of fifty lecturers was measured by questionnaire. The length of time that each lecturer had been in the university was also recorded. After collecting these data, it was found that the scores were somewhat skewed towards the "highly obsessive" end of the scale. Which test should be used to measure the strength of the relationship between obsession and length of time in employment?