BSC HONS IN PSYCHOLOGY
PLU4303 - INTRODUCTION TO STATISTICS IN PSYCHOLOGY - LEVEL 4
FINAL EXAMINATION PAPER
DURATION: 03 HOURS

DATE: 20.09.2023 TIME: 9.30am – 12.30pm

2.1 A Medical researcher is investigating the effectiveness of a pain killer drug (Drug A). Drug A was given to 6 patients. The time (in minutes) taken to alleviate pain is given below.

98, 95, 104, 88, 91, 90

a) Find the mean of the data. **(2 Marks)**
b) Find the median of the data. **(2 Marks)**
c) Comment about the mode of the data. **(2 Marks)**
d) Calculate the variance. Make a table to help you. **(7 Marks)**

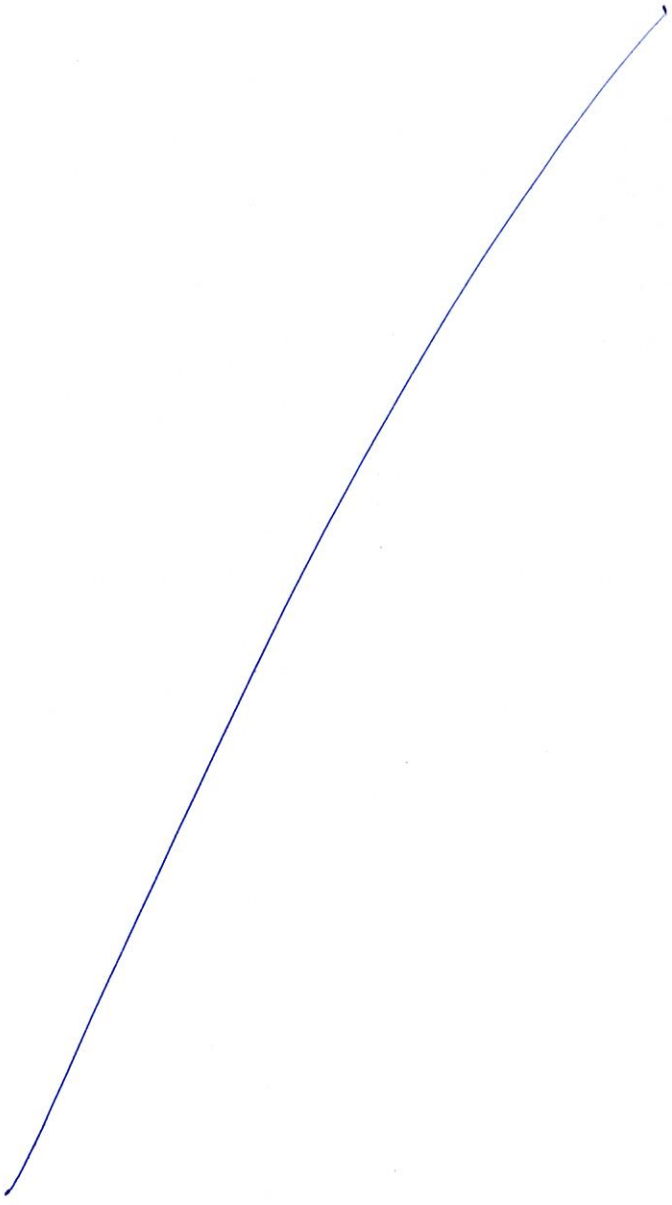
x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
	$\sum_{i=1}^{6}(x_i - \bar{x})^2 =$	

Variance =

e) Obtain the standard deviation. **(2 Marks)**

2.2 A researcher found that a new variety green gram is expected to give a yield of 12.0quintals per hectare, based on his field experiments. The variety was tested on 10 randomly selected farmers' fields. The mean and the standard deviation of the yield were 12.63 quintals/hectare and 1.09 quintals/hectare respectively. The researcher wants to check whether the results conforms the expectation.

a) Write the null and alternative hypothesis. **(2 marks)**
b) Calculate the test statistics value using following formula. **(5 marks)**
c) Find the degree of freedom to determine the t-table value. **(2 marks)**
d) Write down the decision rule. (t-table value at a 5% alpha level is 2.262) **(3 marks)**
e) Write the conclusion. **(3 marks)**



2.3 Write down the short answers for the following questions.

a) Use of z distribution and t distribution in hypothesis testing. **(3 Marks)**

b) What is a hypothesis? **(3 Marks)**

c) What are the main steps that should be followed in hypothesis testing? **(3 Marks)**

d) When do you use paired t-test in analyzing a data set? **(3 Marks)**

e) When do you use ANOVA test in analyzing a data set? **(3 Marks)**

2.4 A study was conducted by a researcher to check the relationship between feeling of stress and life satisfaction. Measurements from 10 persons were obtained and participants completed a measure on how stressed they were feeling (on a 1 to 30 scale) and a measure of how satisfied they felt with their lives (measured on a 1 to 10 scale). The recorded data were as follows. Using this data, answer the following questions.

Stress score (X)	Life Satisfaction (Y)
11	7
25	1
19	4
7	9
23	2
6	8
11	8
22	3
25	3
10	6

a) Complete the following table. **(5 Marks)**

X	X^2	Y	Y^2	$X \times Y$
11		7		
25		1		
19		4		
7		9		
23		2		
6		8		
11		8		
22		3		
25		3		
10		6		

b) Calculate following measures. **(5 Marks)**

i. $\sum_{i=1}^{10} X_i =$

ii. $\sum_{i=1}^{10} Y_i =$

iii. $\sum_{i=1}^{10} X_i^2 =$

iv. $\sum_{i=1}^{10} Y_i^2 =$

v. $\sum_{i=1}^{10} X_i Y_i =$

c) Calculate the correlation coefficient (r) using following equation. **(3 Marks)**

$$r = \frac{n\sum_{i=1}^{n} xy - [\sum_{i=1}^{n} x][\sum_{i=1}^{n} y]}{\sqrt{n(\sum_{i=1}^{n} x_i^2) - (\sum_{i=1}^{n} x_i)^2}\ \sqrt{n(\sum_{i=1}^{n} y_i^2) - (\sum_{i=1}^{n} y_i)^2}}$$

d) Interpret your result obtained in part (iii). **(2 Marks)**

2.5 Write the answers for the following questions.

a) Identify the population and the sample: **(3 Marks)**
   i. A survey of 1353 American households found that 18% of the households own a computer.
   ii. A recent survey of 2625 elementary school children found that 28% of the children could be classified obese.
   iii. The average weight of every sixth person entering the mall within 3 hour period was 146 lb.

b) Identify whether the statement describes inferential statistics or descriptive statistics: **(4 Marks)**
   i. The average age of the students in a statistics class is 21 years.
   ii. The chances of winning the California Lottery are one chance in twenty-two million.
   iii. There is a relationship between smoking cigarettes and getting emphysema.
   iv. From past figures, it is predicted that 39% of the registered voters in California will vote in the June primary

c) Identify the data set's level of measurement (nominal, ordinal, interval, ratio): **(5 Marks)**
   i. Hair color of women on a high school tennis team
   ii. Temperatures of 22 selected refrigerators
   iii. Number of milligrams of tar in 28 cigarettes
   iv. Marriage status of the faculty at the local community college
   v. The ratings of a movie ranging from "poor" to "good" to "excellent"

d) Decide which method of data collection you would use to collect data for the study (observational study, experiment, or survey): **(3 Marks)**
   i. A study of the salaries of college professors in a particular state
   ii. A study where a political pollster wishes to determine if his candidate is leading in the polls
   iii. A study of the effects of a fertilizer on a soybean crop

2.6 A study was conducted to evaluation of training programs. The goal of the study is to examine whether there is significant difference in learning time using different training methods. There are four different training methods (M1, M2, M3, and M4), and method is the factor variable and learning time is the dependent variable. Write the answers based on the given SPSS outputs.

a) What is the suitable statistical test to check the above claim? **(2 Marks)**

b) Write the null and alternative hypothesis. **(2 Marks)**

c) Comment on the following test of Homogeneity of Variances at 5% significance level. **(3 Marks)**

Test of Homogeneity of Variances

Learning Time

Levene Statistic	df1	df2	Sig.
.267	3	8	.848

d) Interpret the following test output at 5% significance level. **(3 Marks)**

Learning Time

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	348.000	3	116.000	11.600	.003
Within Groups	80.000	8	10.000		
Total	428.000	11			

e) Interpret the following Multiple comparison output at 5% significance level. **(5 Marks)**

Multiple Comparisons

Dependent Variable: Learning Time

Tukey HSD

(I) Training Method	(J) Training Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
M1	M2	-4.00	2.58	.455	-12.27	4.27
	M3	-2.00	2.58	.864	-10.27	6.27
	M4	-14.00*	2.58	.003	-22.27	-5.73
M2	M1	4.00	2.58	.455	-4.27	12.27
	M3	2.00	2.58	.864	-6.27	10.27
	M4	-10.00*	2.58	.020	-18.27	-1.73
M3	M1	2.00	2.58	.864	-6.27	10.27
	M2	-2.00	2.58	.864	-10.27	6.27
	M4	-12.00*	2.58	.007	-20.27	-3.73
M4	M1	14.00*	2.58	.003	5.73	22.27
	M2	10.00*	2.58	.020	1.73	18.27
	M3	12.00*	2.58	.007	3.73	20.27

*. The mean difference is significant at the .05 level.

----------END OF QUESTION PAPER----------