



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

INSTITUTIONAL BASED PROGRAMME (IBP) – DECEMBER SESSION

EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN

MICROBIOLOGY

SBT 501: ADVANCED BIOSTATISTICS

DATE: Thursday 3rd May 2012

TIME: 9.00a.m – 12.00p.m

INSTRUCTIONS: Answer any four questions

1. a) Using appropriate illustrations and/or examples if necessary differentiate between correlation and regression. [4marks]
- b) The value of correlation of coefficient (r) range from -1 to +1. Using appropriate illustrations, explain the difference between these two extreme values of r. [6marks]
- c) The following data obtained by a researcher investigating the relationship between serum cholesterol (mg/100ml) and calcium deposit (mg.100g dry weight of body tissue) in 9 animals.

Calcium X	59	52	42	59	24	25	40	32	64
Cholesterol Y	208	300	345	370	250	280	340	298	369

- i) State the null and alternative hypothesis. [4marks]
- ii) Using the *Data Analysis* tool of Microsoft excel compute the correlation and coefficient for these data. [5marks]
- iii) Comment on your results and discuss how you can tell whether the relationship is significant. [6marks]

2. Summarize your understanding about:

- a) Paired t-test
- b) Two Sample t-test for means
- c) Single factor Analysis of variance
- d) Random sampling
- e) Non-parametric tests

3. The table below summarizes the data collected by a student investigating the relationship between hair colour and sex in humans.

Sex	Hair colour				Total
Male	32	43	16	9	100
Female	35	65	64	16	200
total	87	108	100	25	300

a) State the appropriate null and alternative hypothesis. [5marks]

b) Using Microsoft Excel spreadsheet or a calculator, compute the value of X^2 .

[15marks]

c) Given $X^2_{0.05,3} = 7.815$, = interpret your results.

[5marks]

4. Five maize hybrids are available in the market. A researcher wanted to find out if there is a difference in maize yield based on the Hybrid type used. The table bellow summarizes his results.

Maize yield (kg) after using Fertilizer				
A	B	C	D	E
65	78	55	50	70
75	79	60	65	80
55	89	65	75	65
60	83	55	55	70
65	81	70	60	75
55	80	65	65	60

a) State the null and alternative hypothesis.

[4marks]

b) Input the data in a computer and test your hypothesis using an appropriate parametric test.

[10marks]

- c) State the assumptions of the method used in testing your hypothesis. [6marks]
- d) Discuss the options available to test your hypothesis if the assumptions in c above were not met. [5marks]

5. The following data were obtained from an experiment with the objective of investigating weight gain in laboratory mice based on two diets.

Diet A	8.8	6.4	7.7	8.3	7.9	8.2	8.5	8.0	8.1
Diet B	10.0	9.3	10.3	9.7	11.0	12.0	9.8	10.5	12.0

The researcher performed a two-sample t-test using Microsoft Excel and obtained the following results.

t-test: Two-Sample Assuming Equal Variances		
	<i>Variable 1</i>	<i>Variable 2</i>
Mean	7988889	10.51111
Variance	0.46111	0.951111
Observations	9	9
Pooled Variances	0.706111	
Hypothesized Mean Difference	0	
Df	16	
t-Test	-6.36727	
P(T<=t) one-tail	4.67E-06	
t Critical one-tail	1.745884	
P(T<=t) two-tail	9.34E-06	
t Critical two-tail	2.119905	

- a) State two assumptions that the researcher have made while selecting t-test to analyze the data. [4marks]
- b) State the appropriate null and alternative hypothesis for this analysis. [4marks]
- c) Was there significant difference in weight gained based on the diet? Explain your conclusion. [12marks]
- d) What do you understand by “one-tail” and “two-tail” as used in the results above? [5marks]