



MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN BIOMEDICAL SCIENCES

CITY CAMPUS

PMT 810: BIostatISTICS

Date: 23rd March, 2018

Time: 8.00 - 11.00 am

INSTRUCTIONS:

- Answer Question ONE and any other FOUR.
- Note that Q3-Q5 will require use of SPSS
- For Q2-Q5, briefly describe how you would write the Data Analysis and results sections of your research thesis in the context of each statistical tool.
- All questions carry 25 marks.



Questions

Q1: Answer the following questions

- a) Describe the three levels of measurements as used in the framework of SPSS.
- b) Describe the research context, with clearly defined variables, where the i) one-sample t-test, ii) Wilcoxon test, and iii) chi-square test of independence is an appropriate statistical test.

Q2: Design a research project of your choice and use it to answer the following questions.

- a) Briefly describe one sampling procedure you would use to select items or subjects to include in your research project so as to limit bias.
- b) Construct an appropriate null hypothesis.
- c) Identify an appropriate statistical test for the hypothesis in part b) above.

- d) Briefly explain why the statistical test you have identified is appropriate for testing the hypothesis in part b above.
- e) Outline the steps you would follow to test the null hypothesis.

Q3: Use the data set below to answer the following questions.

Age: 78, 72, 81, 59, 64, 46, 44, 42, 45, 78, 47, 50, 57, 42, 58, 52, 52, 58, 45

Bilirubin levels: 7.5, 12.9, 14.3, 8.0, 14.1, 10.9, 12.3, 7.0, 1.8, 0.8, 3.8, 3.5, 5.1, 16.5, 1.0, 5.2, 5.1, 3.5, 5.6, 1.9

- a) Determine the linear model that explains the relationship between age and bilirubin levels.
- b) Determine whether the linear model explains significant variation in bilirubin levels.
- c) The amount of variation in bilirubin levels that is explained by the linear model identified in part a) above.

Q4. A clinical trial compared viral loads in 15 patients before and after treatment using a new anti-retroviral regimen. Determine whether there is adequate statistical evidence to conclude that the new therapy is effective. Note: Assume that the data do not violate assumptions of parametric tests.

Before treatment	After treatment
7500	400
8000	250
2000	800
550	1400
1250	8000
1000	7400
2250	1020
6800	6000
3400	920
6300	1420
9100	2700
970	4200
1040	5200
670	4100
400	Missing

Q5: The following data represent estrogen levels in a group of women following exposure to an industrial chemical that is thought to have adversely increased estrogen levels and is therefore suspected to coincide with increasing incidence of breast cancer among women thought to have been exposed. Use the data set to answer the following questions

- a) Identify and justify your choice of statistical test for analysis of the data to determine whether there is enough statistical evidence to conclude that the suspected pollutant adversely affected estrogen levels in the exposed group of women.
- b) Use the statistical test in part a) above to compare the estrogen levels in the exposed women against those of a control group

Exposed: 1820, 2588, 2670, 1022, 1555, 222, 1197, 1249, 1520, 489, 191, 1098, 644, 136, 1605, 1247, 1529, 1422, 445, 990

Control: 724, 613, 918, 949, 877, 1368, 1692, 697, 847, 1199, 1652, 1309, 1002, 966, 788, 472, 471, 771, 869, 513

Q6: The data set below shows peak knee velocity at extension and flexion in individuals suffering from cerebral palsy. Use it to answer the following questions

- a) Identify and justify your choice of statistical test for analysis of the data to determine the relationship between flexion and extension and peak knee velocity.
- b) Use the statistical test in part a) above to determine the relationship between flexion and extension and peak knee velocity.

Flexion: 100, 150, 210, 255, 200, 185, 440, 110, 400, 160, 150, 425, 375, 400, 400, 300, 300, 320

Extension: 100, 150, 180, 165, 210, 155, 440, 180, 400, 140, 250, 275, 340, 400, 450, 300, 300, 275