



MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES & TECHNOLOGY

DEPARTMENT OF APPLIED STATISTICS

MODULE: RESEARCH METHODS

CODE: ASTA 217

SESSIONAL EXAMINATIONS

APRIL 2023

DURATION: 3 HOURS

EXAMINER: MR A CHAKAIPA

INSTRUCTIONS

1. Answer **All** in Section A
2. Answer **three** questions in Section B.
3. Start a new question on a fresh page
4. Total marks 100

Additional material(s): Non-programmable electronic scientific calculator,
Statistical Tables.

SECTION A [40 MARKS]

Answer ALL questions in this section

A1

- (a) Explain the importance of literature review as part of the research process
- (b) State and explain in brief any four objectives of carrying research.

[4, 7]

A2

Discuss what is involved in the following terms used in social research:

- a) Voluntary participation.
- b) Anonymity.
- c) Confidentiality.
- d) Adherence to professional code of ethics.

[3, 3, 3, 3]

A3

- (a) State four disadvantages of a face to face interview in a survey.
- (b) Discuss the four classifications of surveys.
- (c) Pre-coding is often employed in questionnaire design in both closed-ended questions and open-ended questions.
 - i) Why is pre-coding necessary especially in open-ended questions?
 - ii) Suggest possible pre-coding way to the following question. What is your salary in United States Dollars?

[4, 8, 3, 2]

SECTION B [60 MARKS]

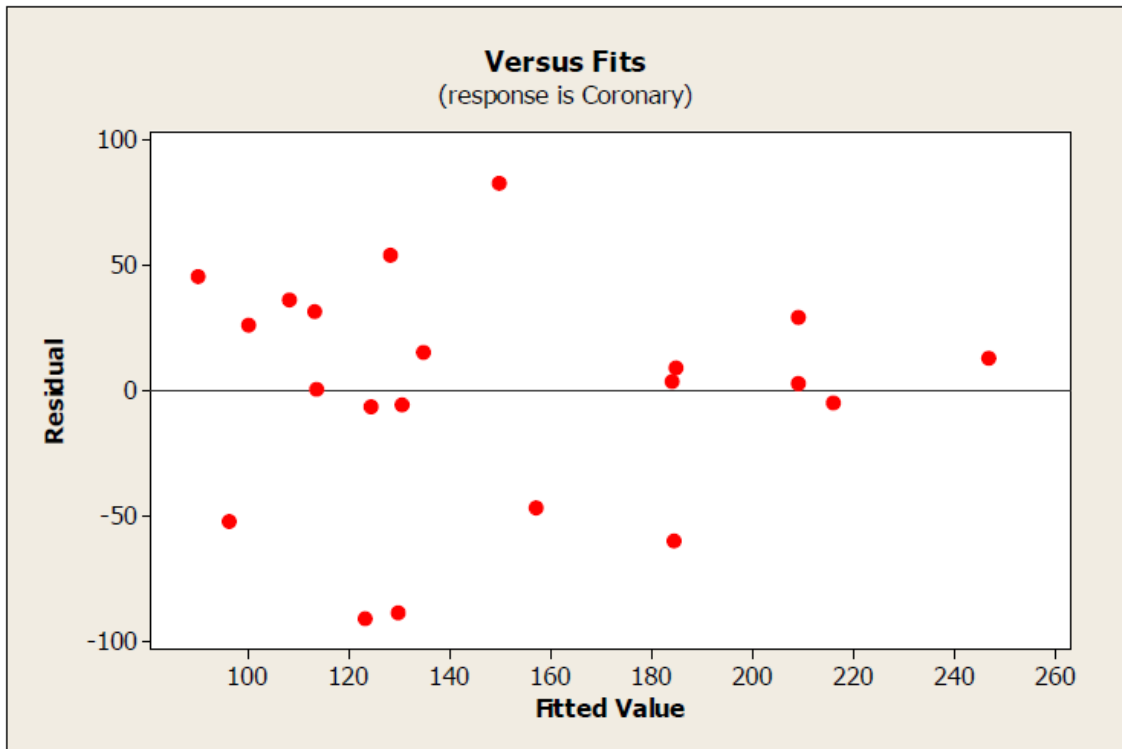
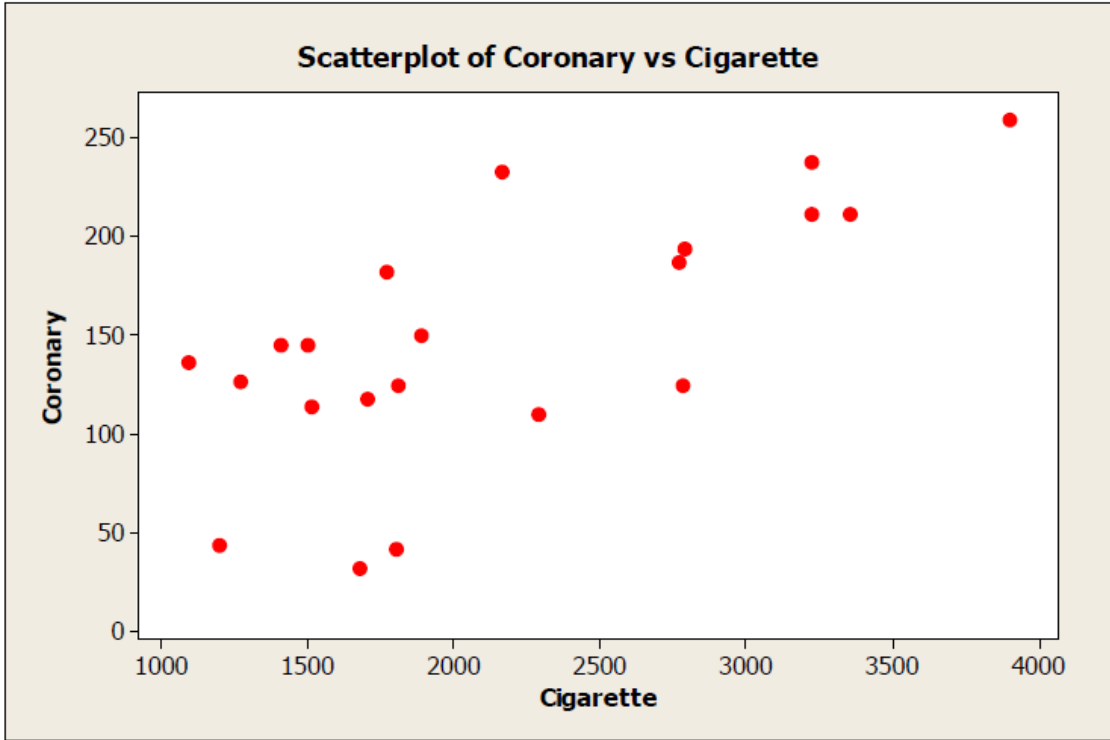
*Answer any **THREE** questions in this section*

B4.

The following table presents data collected in the 1960s for 21 countries on X = Annual Per Capita Cigarette Consumption (“Cigarette”), and Y = Deaths from Coronary Heart Disease per 100,000 persons of age 35 – 64 (“Coronary”).

Country	Cigarette	Coronary
United States	3900	259.9
Canada	3350	211.6
Australia	3220	238.1
New Zealand	3220	211.8
United Kingdom	2790	194.1
Switzerland	2780	124.5
Ireland	2770	187.3
Iceland	2290	110.5
Finland	2160	233.1
West Germany	1890	150.3
Netherlands	1810	124.7
Greece	1800	41.2
Austria	1770	182.1
Belgium	1700	118.1
Mexico	1680	31.9
Italy	1510	114.3
Denmark	1500	144.9
France	1410	144.9
Sweden	1270	126.9
Spain	1200	43.9
Norway	1090	136.3

The following outputs were generated from running a statistical software.



Regression Analysis: Coronary versus Cigarette

The regression equation is
Coronary = 29.5 + 0.0557 Cigarette

Predictor	Coef	SE Coef	T	P
Constant	29.45	29.48	1.00	0.330
Cigarette	0.05568	0.01288	4.32	0.000

S = 46.5558 R-Sq = 49.6% R-Sq(adj) = 46.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	40484	40484	18.68	0.000
Residual Error	19	41181	2167		
Total	20	81666			

- (a). Based on the scatterplot of Coronary versus Cigarette, does there appear to be a linear relationship between cigarette consumption and coronary heart disease? If so, does the relationship appear to be negative or positive?
- (b) What is the expected coronary deaths for a country with a cigarette consumption of 2000?
- (c) Is there a significant linear relationship between coronary heart disease and cigarette consumption? Provide a null hypothesis, alternative hypothesis, a test statistic, rejection criteria and conclusion.
- (d) What is the estimated variance of the observations?
- (e) Compute the Total Sums of Squares (SST) for this data?
- (f) Compute the coefficient of correlation, r and explain the nature and strength of the relationship between coronary heart disease and cigarette

consumption .

[3, 2, 5, 3, 3, 4]

B5

A preliminary analysis of a survey of 44177 people with asthma has revealed that the condition causes frequent symptoms and substantially interferes with daily life. There is also a trend for older people with asthma to experience more problems. More information about treatment was seen by many as the best way to improve care. The impact of Asthma Survey was conducted by Gallup on behalf of the National Asthma Campaign with funding from Allen and Hanburys. Questionnaires were given to people with asthma via surgeries, pharmacies, retail outlets, the media and direct mailing in the autumn of 1995; the respondents were therefore self-selected and may not be representative of the population with asthma. Asthma symptoms were experienced on most days or daily by 41% of survey respondents, ranging from 18% of the under-11s to 55% of pensioners. Waking every night with wheeze, cough or breathlessness was reported by 13% and 43% say they are woken by symptoms at least once a week. About 20% consider that asthma dominates their life, ranging from 17% in children to 37% in the over-60s; over 40% of each age group say the condition has a moderate impact on their quality of life.

- a) How was the sample selected for this survey?
- b) Did the researchers use random or non-random sampling methods?
- c) What are the advantages of their approach?
- d) What are the disadvantages of this approach'?
- e) The sample size was 44177. Why was the sample size so large and was this necessary?

[2, 3, 5, 5, 5]

B6

- a) Explain the advantages of an open-ended questions over closed format questions in a questionnaire.
- b) Give three reasons for asking a question in closed form rather than in open-ended form in order to obtain information.

- c) A researcher wants to find out the best seller food products brands of the year in China. In this case the target population is constituted by every market where the food products are sold. The population is not only spread

over a wide geographical region of the country but is also dispersed. There are 150 cities in China to be included in the study. Devise a sampling scheme which is a combination of stratified random sampling and cluster sampling.

[5, 5, 10]

B7

- a) Distinguish carefully between stratified sampling, cluster sampling and quota sampling, stating the benefits and drawbacks of each method.
- b) A stratified sample of size $n=60$ is to be taken from a population of size $N=4000$, which consists of three strata of sizes $N_1=2000$, $N_2=1200$ and $N_3=800$. If the allocation is to be proportional, how large a sample must be taken from each stratum?

[12, 8]

END OF QUESTION PAPER