NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES

DEPARTMENT OF ARCHITECTURE AND SPATIAL PLANNING

QUALIFICATION:	BACHELOR OF REGIONAL AND RURAL DEVELOPMENT		
QUALIFICATION CODE:	07BRRD	LEVEL:	5
COURSE CODE:	SRP520S	COURSE NAME:	STATISTICS FOR REGIONAL PLANNERS
SESSION:	NOVEMBER 2019	PAPER:	THEORY
DURATION:	3 HOURS	MARKS:	100

INSTRUCTIONS
1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Calculator

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

Question 1

(a) Provide three (3) themes that recur in the definitions of statistics.   (3)

(b) Indicate the two main groups of data **AND** whether surveys for these sources are generally (A) cross-sectional or (B) longitudinal surveys, **AND** provide an example for each.   (6)

(c) Complete the following table: (10)
     (draw it out onto your answer paper)

		Quantitative Research	Qualitative Research
(i.)	Purpose/objective		
(ii.)	Sample size		
(iii.)	Data collection		
(vi.)	Data analysis		
(v.)	Outcome		

[19]

Question 2

Table 1 presents the percentage distribution of households with no toilet facility in Namibia, as derived from the Namibia Statistics Agency's *Namibia Inter-censal Demographic Survey 2016 Report*. Study Table 1 below and answer the proceeding questions.

Table 1: Percent Distribution of Households with No Toilet Facility in Namibia

Region	Households with No Toilet Facility (%)
!Kharas	25.10
Erongo	12.90
Hardap	44.00
Kavango East	63.00
Kavango West	84.50
Khomas	25.20
Kunene	64.50
Ohangwena	72.10
Omaheke	56.10
Omusati	71.00
Oshana	27.20
Oshikoto	56.80
Otjozondjupa	39.20
Zambezi	82.10

Namibia Statistics Agency (NSA), 2017

(a) The Mean is one of the three common Measures of Central Tendency. Calculate the Mean using the data in Table 1. Please show all calculation steps including the formula, and round off your final answer to the <u>nearest whole number</u>.   (4)

(b) Measures of dispersion use one value to describe the extent of spread between the data points and the mean. Using the mean value (use the whole number) you calculated in Question 1(a) and the data in Table 1, compute the <u>population standard deviation</u> for the percentage distribution of households with no toilet facility in Namibia. Please <u>show all calculation steps (including formulas)</u>, and round off all your calculations and final answer to <u>two decimal points</u>.   (20)

(c) Demographic data forms the basis for many regional planning/rural development activities. Provide five (5) activities that justify the need for demographic data.   (5)

[29]

Question 3

(a) Time series is data taken at a discrete set of time points. Explain the time series component represented by Figure 1 below.   (5)
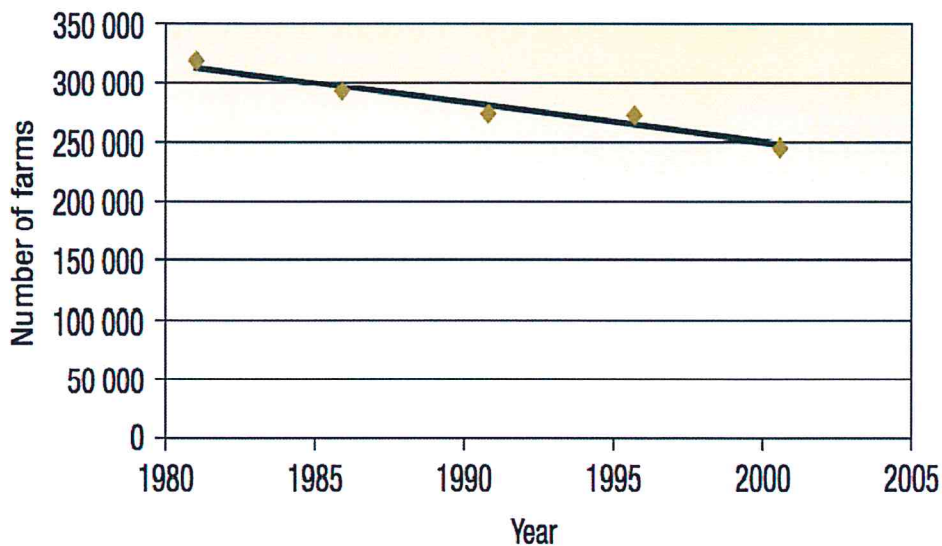

Figure 1: Number of Farms from 1981 to 2001
Source: McGraw-Hill, n.d.

(b) Cyclical variations are components of time series, and show how time series rise and fall over periods longer than one year, through stages with no fixed duration of the cycle. Using Figure 2, identify the cyclical variation stages of mortgage growth rate in Namibia, as shown by points "A" to "D". Please do not indicate the stages on the actual question paper; instead, please write in your answer sheet (examination script) the stages represented by each letter.   (4)
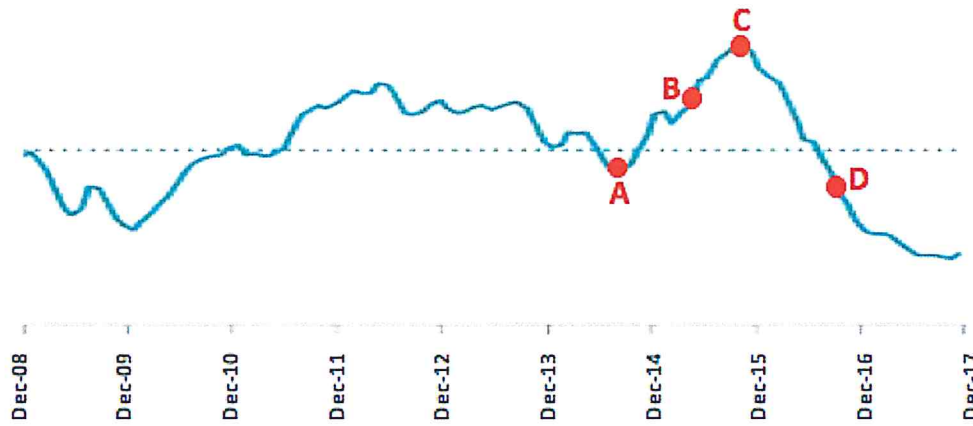
Figure 2: Mortgage Growth Rate in Namibia
Adapted from Unassuming Economist, 2018

[9]

Question 4

(a) Infant Mortality Rate (IMR) is a more sensitive reflection of the health status and well-being of a community. Calculate the IMR using the data in Tables 2 and 3. Please round off your answer to the nearest whole number. (5)

Table 2: Reported Crude Birth Rate in Namibia

Area	Population	Reported Births 15-49	CBR
Namibia	2 324 388	75 765	32.6

Adapted from Namibia Statistics Agency (NSA), 2017

Table 3: Deaths by Age and Sex, Namibia

Reported Age at Death	Death		
	Total	Female	Male
Under 1	2 351	1 268	1 083
1-4	1 542	960	582

Adapted from Namibia Statistics Agency (NSA), 2017

(b) According to the Namibia Statistics Agency's *Namibia 2011 Population and Housing Census Indicators*, the total population size for Hardap Region was 68,249 in 2001 and 79,507 in 2011. Assuming a geometric growth rate and using the geometric growth projection, determine the population size of the Hardap Region in 2025. Please show all calculation steps including formulas. Furthermore, please use the complete growth rate, and round off the 2025 population size to the nearest whole number. (8)

(c) It is important for regional and development planners (especially in the public sector) to take into account past, present and future population data. Explain why it is important for the public sector to consider population analyses in regional planning and development.   (6)

[19]

Question 5

Various tools can be used to analyse relationships involving more than one variable. Explain the purposes of one of the bivariate analyses represented by the equation "y = a + bx."

[8]

Question 6

Migration has an impact on both the destination area and home area. Briefly discuss three (3) advantages and three (3) disadvantages of migration on the home area.

[6]

Question 7

State whether the following are true or false.

(a) Inferential statistics makes predictions of the future and generalisations of the population by studying a smaller sample   (2)

(b) The net migration rate can be determined by subtracting in-migration from the out-migration figures   (2)

(c) Cluster sampling uses chain-referral by the recruiting sample based on key/specialist knowledge regarding the topic being researched   (2)

(d) The median is sensitive to outliers   (2)

(e) Counter migration involves the voluntary return of migrants to their original place after they outlive the reason which they left   (2)

[10]

___

TOTAL MARKS   **100**
___

END

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FIRST OPPORTUNITY EXAMINATION MEMORANDUM	
EXAMINER(S)	Mr A Harris / (061)2072361 / aharris@nust.na
MODERATOR:	Dr E Yankson / (061)2072407 / eyankson.nust.na

INSTRUCTIONS
1. The model answers are used as guidelines only.
2. The information presented by the students will be evaluated on merit.

THIS MEMORANDUM CONSISTS OF 10 PAGES (Including this front page)

Question 1

(a)   Provide three (3) themes that recur in the definitions of statistics.   (3)

Answer:
- *Practice or science (development of methods/toolbox) of collecting and analysing numerical data in large quantities* ✓
- *For purpose of inferring proportions in a whole (answering specific questions/about uncertainties/frame discussions)* ✓
- *In a representative sample (unbiased/not preconceived idea/accuracy)* ✓

(b)   Indicate the two main groups of data **AND** whether surveys for these sources are generally **(A)** cross-sectional or **(B)** longitudinal surveys, **AND** provide an example for each.   (6)

Answer (one marks per answer or similar):
- *Stocks* ✓ *– (a) cross-sectional surveys* ✓ *; e.g. population (size, composition) and housing census* ✓
- *Flows* ✓ *– (b) longitudinal surveys* ✓ *; e.g. births, deaths, migration* ✓

(c)   Complete the following table: (10)
      (draw it out onto your answer paper)

Answer:

		Quantitative Research	Qualitative Research
(i.)	Purpose/objective	*Generisability (quantify the data and generalise results from sample to population), prediction, causal explanation* ✓	*Contextualisation, interpretation, understanding perspectives; insight into attitudes and behaviour (qualify underlying reasons and motivations)* ✓
(ii.)	Sample size	*Large number of cases representing the population; randomly selected respondents* ✓	*Small number of non-representative cases; respondents selected on their experiences* ✓
(iii.)	Data collection	*Structured* ✓	*Unstructured* ✓
(vi.)	Data analysis	*Statistical* ✓	*Non-statistical* ✓
(v.)	Outcome	*Recommend a final course of action* ✓	*Develop an initial understanding* ✓

[19]

Question 2

Table 1 presents the percentage distribution of households with no toilet facility in Namibia, as derived from the Namibia Statistics Agency's *Namibia Inter-censal Demographic Survey 2016 Report*. Study Table 1 below and answer the proceeding questions.

Table 1: Percent Distribution of Households with No Toilet Facility in Namibia

Region	Households with No Toilet Facility (%)
!Kharas	25.10
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Oshikoto	56.80
Otjozondjupa	39.20
Zambezi	82.10

Namibia Statistics Agency (NSA), 2017

(a) The Mean is one of the three common Measures of **Central Tendency**. Calculate the Mean using the data in Table 1. Please show all calculation steps including the formula, and round off your final answer to the <u>nearest whole number</u>.   (4)

Answer:

$$\overline{x} = \frac{\sum x}{n} \checkmark$$

$$= \frac{723.7 \checkmark}{14 \checkmark}$$

$$= 51.69285714$$

$$\sim \mathbf{52\%} \checkmark$$

(b) Measures of dispersion use one value to describe the extent of spread between the data points and the mean. Using the mean value (use the whole number) you calculated in Question 1(a) and the data in Table 1, compute the <u>population standard deviation</u> for the percentage distribution of households with no toilet facility in Namibia. Please <u>show all calculation steps (including formulas)</u>, and round off all your calculations and final answer to <u>two decimal points</u>.   (20)

Answer:

First find $(X - \mu)$, $(X - \mu)^2$ *and* $\sum (X - \mu)^2$

Region	Households with No Toilet Facility (%)	$(X - \mu)$	$(X - \mu)^2$
!Kharas	25.10	-26.90 ½	723.61 ½
Erongo	12.90	-39.10 ½	1528.81 ½
Hardap	44.00	-8.00 ½	64.00 ½
Kavango East	63.00	11.00 ½	121.00 ½
Kavango West	84.50	32.50 ½	1056.25 ½
Khomas	25.20	-26.80 ½	718.24 ½
Kunene	64.50	12.50 ½	156.25 ½
Ohangwena	72.10	20.10 ½	404.01 ½
Omaheke	56.10	4.10 ½	16.81 ½
Omusati	71.00	19.00 ½	361.00 ½
Oshana	27.20	-24.80 ½	615.04 ½
Oshikoto	56.80	4.80 ½	23.04 ½
Otjozondjupa	39.20	-12.80 ½	163.84 ½
Zambezi	82.10	30.10 ½	906.01 ½
		$\sum(X - \mu)^2$	6857.91 ✓

Second find population standard deviation:

$$\sigma = \sqrt{\frac{\sum(X - \mu)^2}{n}} \quad ✓$$

$$= \sqrt{\frac{6857.91 ✓}{14 ✓}}$$

$$= 22.1325713437394$$

$$\sim \quad \textbf{22.13\%} ✓ ✓$$

(c) Demographic data forms the basis for many regional planning/rural development activities. Provide five (5) activities that justify the need for demographic data.   (5)

Answer:

- *Formulating comprehensive plans / future regional plans* ✓
- *Formulating land use and transportation plans* ✓
- *Determining the direction of future economic development* ✓
- *Providing guidance for social services (housing, school, hospital, etc.)* ✓
- *Providing guidance for sustainable development (development that doesn't compromise vitality of future generations or integrity of natural environment).* ✓

[29]

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(a) Time series is data taken at a discrete set of time points. Explain the time series component represented by Figure 1 below.   (5)
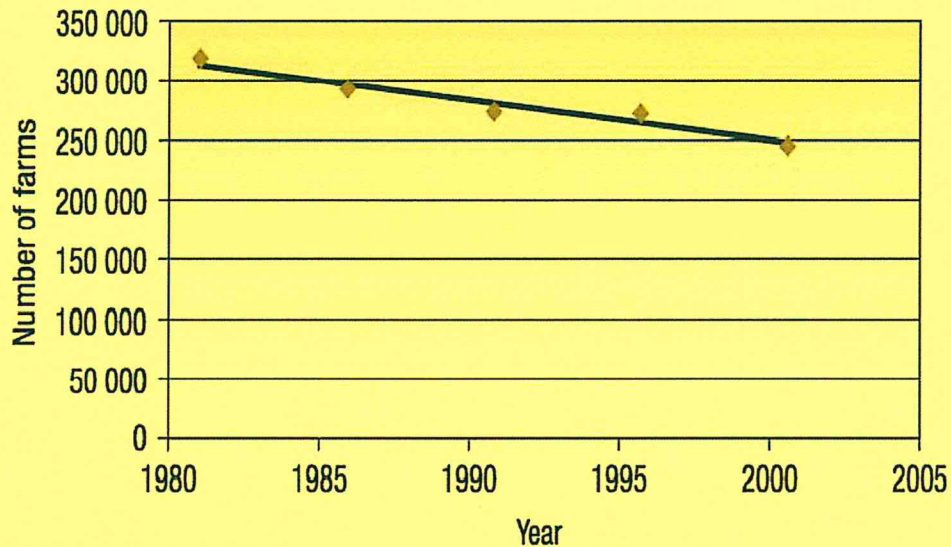

Figure 1: Number of Farms from 1981 to 2001
Source: McGraw-Hill, n.d.

Answer:

- *The figure shows the Trend / Secular Trend*✓
- *The trend is a smooth long-term direction of a time series.* ✓
- *This particular Figure 1 shows a decrease in the movements of time series (that is a decrease/decline/negative in the number of farms over time)* ✓
- *The data is taken over a long period (being from 1980 – 2001)* ✓
- *The trend is linear*✓

(b) Cyclical variations are components of time series, and show how time series rise and fall over periods longer than one year, through stages with no fixed duration of the cycle. Using Figure 2, identify the cyclical variation stages of mortgage growth rate in Namibia, as shown by points "A" to "D". Please do not indicate the stages on the actual question paper; instead, please write in your answer sheet (examination script) the stages represented by each letter.   (4)
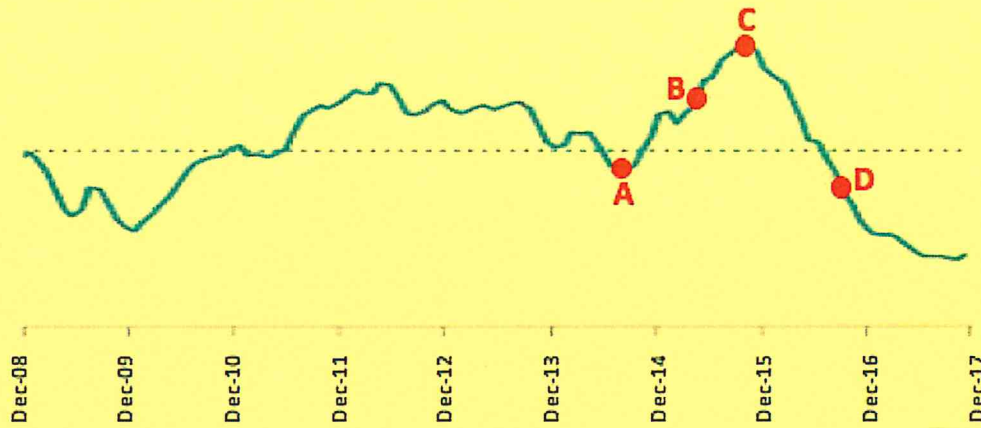
Figure 2: Mortgage Growth Rate in Namibia
Adapted from Unassuming Economist, 2018

Answer:

- *A = Depression*✓
- *B = Recovery*✓
- *C = Prosperity*✓
- *D = Recession*✓

[9]

Question 4

(a) Infant Mortality Rate (IMR) is a more sensitive reflection of the health status and well-being of a community. Calculate the IMR using the data in Tables 2 and 3. Please round off your answer to the nearest whole number. (5)

Table 2: Reported Crude Birth Rate in Namibia

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1-4	1 542	960	582

Adapted from Namibia Statistics Agency (NSA), 2017

Answer:

$$IMR= \frac{\text{Number of Infant Deaths during time period }^{1/2}}{\text{Number of Live Births during the time period }^{1/2}} \times 1000 \;^{1/2}$$

$$= \frac{2351 \;^{1/2}}{75765 \;^{1/2}} \times 1000 \;^{1/2}$$

$$= 31.03 \quad \sim \quad \mathbf{31}\checkmark\checkmark$$

(b) According to the Namibia Statistics Agency's *Namibia 2011 Population and Housing Census Indicators*, the total population size for Hardap Region was 68,249 **in** 2001 **and** 79,507 in 2011. Assuming a geometric growth rate and using the <u>geometric growth projection</u>, determine the population size of the Hardap Region in 2025. Please **show all calculation** steps including formulas. Furthermore, please use the <u>complete growth rate</u>, **and** round off the 2025 population size to the <u>nearest whole number</u>. (8)

Answer:

$$r \;=\; (P_t / P_0)^{1/t} - 1 \;\checkmark$$
$$=\; (79{,}507/68{,}249)^{1/10} - 1 \;\checkmark$$
$$=\; 0.0153853835078921 \;\checkmark$$

$$P_{2025} \;=\; P_0 (1+r)^t \;\checkmark$$
$$=\; 79{,}507\checkmark \, (1+ 0.0153853835078921)^{14} \;\checkmark \; OR$$
$$=\; 68{,}249 \, (1+ 0.0153853835078921)^{24}$$
$$=\; 98{,}455.067$$
$$\sim \quad \underline{\mathbf{98{,}455}}\checkmark\checkmark$$

(c) It is **important for** regional and development planners (especially in the public sector) to take into account past, present and future population data. Explain why it is important for the public sector to consider population analyses in regional planning and development. (6)

Answer::

- *To determine the <u>demand for services</u> among different segments of the population.* ✓
- *To identify <u>best locations to provide services (facilities / programmes)</u> to meet local needs.* ✓
- *To assess the <u>impact of new plans</u> on population change.* ✓
  - *A plan promoting rural industries can lead to population growth.*
  - *Housing and educational plans may need to be revised to meet the needs of new households that may move into the area.*

- *To assess <u>the impact of population growth</u> on the ability to implement existing plans.* ✓
- *Regional planners in the public sector use past, present and future population statistics in <u>development/planning</u> (land use planning, transportation planning, economic development, environmental planning, housing, public services and facilities, sustainable development)* ✓
- *To assist regional planners in their <u>decision processes and decision making.</u>* ✓

[19]

Question 5

Various tools can be used to analyse relationships involving more than one **variable**. Explain the purposes of one of the bivariate analyses represented by the equation "y = a + bx."

Answer:

- *To determine causal effect relationship between the variables (i.e. causes or effects of phenomena)* ✓
- *To forecast (predictive analytics)* ✓ *economic growth / future demand for products or services / future opportunities and risks*
- *To improve theoretical models and explanations of phenomena.* ✓ *OR*
  - *To support or negate theoretical model.*
- *Used for time series modelling.* ✓
- *To optimize business processes* ✓
- *To empirically support decisions* ✓ *OR any of the following:*
  - *To make informed business decisions (instead of basing the decisions on intuition and gut feel)*
  - *to identify errors in judgment prior to decision making*
  - *to provide quantitative support for decisions and prevent mistakes due to decision makers' intuitions.*
  - *to test a hypothesis before diving into decision making or execution.*
- *To uncover new insights (or patterns that were previously unnoticed)* ✓
- *To indicate the strength of impact of multiple independent variables on a dependent variable.* ✓ *OR any of the following:*
  - *To model the relationships between the dependent variable and the explanatory variable.*
  - *To show the significance of relationships between dependent variable and independent variable.*

[8]

Question 6

Migration has an impact on both the destination area and home area. Briefly discuss three (3) advantages and three (3) disadvantages of migration on the home area.

Answer: any six (6) of the following:

Advantages
- *Remittances:* ✓
    - *It is known that migrants send lots of monies home to support their family.*
    - *That is a massive flow of foreign exchange or funds that the local government and families can tap into for development and economic growth.*
- *Better job prospects for locals:* ✓
    - *When the youth leave, there is less pressure for jobs, and people are more likely to find something to do.*
- *Knowledge and skills flow:* ✓
    - *Particularly for short-term and seasonal migration, migrants often bring home new ideas, skills and knowledge that they have acquired from their travel.*
    - *Many businesses, farm practices, and economic ventures have been started by people who got ideas and knowledge during the times they spent in migration.*

Disadvantages
- *Loss of skilled labour:* ✓
    - *The biggest negative impact on the country of exit perhaps is the fact that young graduates (or skilled labour and professional) leave to offer their services to other countries.*
    - *In many developing countries, doctors, nurses, engineers and very bright professionals are lost to other countries.*
- *Population and markets:* ✓
    - *Businesses do better with bigger markets and more buyers.*
    - *A growing and healthy population often provides the needed market for economic growth and development.*
    - *When the youth leave, the population stalls and demand for some goods and services fall.*
- *Social/Family:* ✓
    - *When parents leave, children and other dependents suffer the most, as they lose out on the important psychological development that they need from good parenting.*
    - *Many of the children are exposed to social vices at an early age because there is no parental control.*

[6]

Question 7

State whether the following are true or false.

(a) Inferential statistics makes predictions of the future and generalisations of the population by studying a smaller sample   (2)

(b) The net migration rate can be determined by subtracting in-migration from the out-migration figures   (2)

(c) Cluster sampling uses chain-referral by the recruiting sample based on key/specialist knowledge regarding the topic being researched   (2)

(d) The median is sensitive to outliers   (2)

(e) Counter migration involves the voluntary return of migrants to their original place after they outlive the reason which they left   (2)

Answer:

(a) True ✓✓
(b) False ✓✓
(c) False ✓✓
(d) False ✓✓
(e) True ✓✓

[10]

TOTAL MARKS   **100**

END -

November 2019

SRP520S

Statistics for Regional Planners

Included:

Moderator's report

1st Opportunity question paper

1st Opportunity Memorandum