SECTION A

ANSWER THE FOLLOWING SEVENTY MULTIPLE CHOICE QUESTIONS ON THE MARK READING SHEET. READ THE ATTACHED INSTRUCTIONS AND FOLLOW THEM CAREFULLY.

Question 1

The principal aim of psychological research is to - - - - - about human behaviour .

1. conduct experiments
2. collect and analyse data
3. develop theories

Question 2

A psychologist is interested in studying the interaction between small groups of four to five people each. He makes the assumption that the interaction between such groups may be likened to the way in which governments interact with one another. In order to be able to do a scientific study of this (a) - - - - - question, he would have to provide a(an) (b) - - - - - definition of the (c) - - - - - called "interaction".

1. (a) scientific (b) experimental (c) concept
2. (a) experimental (b) research (c) operational concept
3. (a) research (b) operational (c) construct

Question 3

A psychologist conducts a study in which she measures the reaction times of students doing a psychometric test. She proceeds from the assumption that reaction time correlates with intelligence. In this study 'intelligence' is the - - - - -

1. indicator
2. latent variable
3. manifest variable

Questions 4

In the case of a correlational design, the aim is to - - - - -

1. compare a sample to the population
2. correlate two samples with one another
3. select a single sample and obtain measurements on the variables

Question 5

Consider the hypothesis:

Girls have better verbal abilities than boys, and will perform significantly better than boys in the Star's new essay competition.

Letting μ_{girl} represent the average performance of girls and μ_{boy} the average performance of the boys, the above hypothesis states that - - - - -

1. $\mu_{girl} \geq \mu_{boy}$
2. $\mu_{girl} > \mu_{boy}$
3. $\mu_{girl} < \mu_{boy}$

Question 6

Consider the following Table:

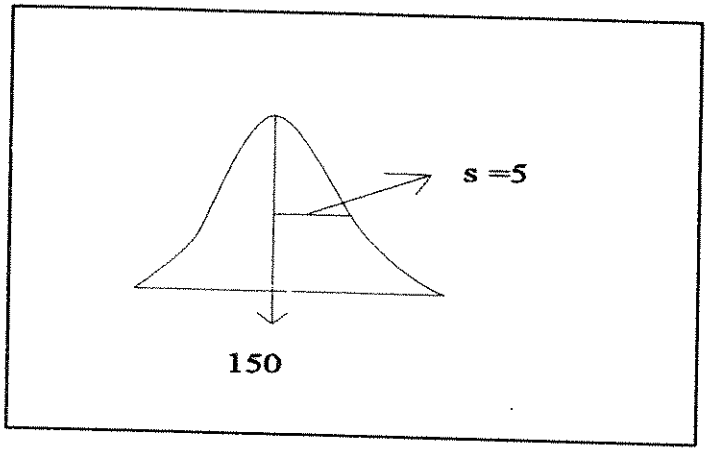
Subject	Student X	Mean of class	Standard deviation of class
A	50%	40%	5%
B	55%	50%	5%
C	60%	50%	10%
D	65%	65%	5%

In which subject did Student X do best, relative to his class?

1. A
2. C
3. D

Question 7

Study the following figure of the normal curve:



What is the size of the area under the curve, to the right side of the average?

1. 100%
2. 0,50
3. 5

Question 8

Select the correct notation from the options below for the statement: The probability value is larger than ½.

1. $p \geq 0,05$
2. $p < 0,05$
3. $p > 0,5$

Consider the following scenario for questions 9 and 10

A researcher conducts an experiment with two groups of university students. The students in the first group are all given 125 ml. of alcohol to drink, while the students in the second group are required to drink 350 ml of alcohol each. She then tests their memory span in a series of psychometric tests and finds that the subjects in the second group have a significantly shorter memory span than the subjects in the first group.

Question 9

The most appropriate formulation of the researcher's research hypothesis is:

1. A study of the memory span among students.
2. Comparing two groups on alcohol consumption.
3. The effect of alcohol consumption on memory span.

Question 10

The independent variable in the study above is:

1. alcohol consumption
2. memory span
3. university students

Question 11

Assume that a researcher believes that education plays a role in promotion. Which one of the following is the most appropriate operational hypothesis?

1. Education plays a role in deciding on the promotion of employees at Computer Solutions Inc.
2. Employees with higher levels of education earn more than employees with lower levels of education at Computer Solutions Inc.
3. Employees with higher levels of education are more likely to be promoted at Computer Solutions Inc. than employees with lower levels of education at corresponding post levels.

Question 12

A standard normal distribution has a standard deviation of - - - - - and a mean of - - - - -.

1. 0; 1
2. 1; 0
3. 1;1

Question 13

Which of the following statements about population parameters is the most accurate?

1. They are essential for making statements about probability distributions.
2. They are always unknown but appropriate values can be estimated prior to sampling.
3. They are essential, but cannot be estimated from sample information.

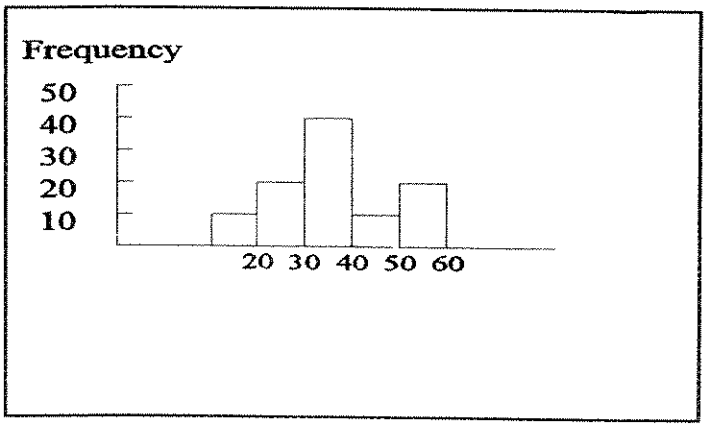
Question 14

Why is the central limit theorem of importance in inferential statistics?

1. Because it informs us how sampling error will increase as the population increases
2. Because it tells us that sampling error will begin to approximate a normal distribution as samples grow larger
3. Because it shows that the sampling distributions of certain sampling statistics will approach a normal distribution as sample sizes increase.

Question 15

Study the histogram below of the exam marks of a group of students in the same class. Note that the values on the horisontal axis are the upper class limits.



Assume we use this histogram as a basis for making probability predictions. What is the probability that a student's score will be between 50 and 60?

1. 0,5
2. 0,3
3. 0,2

Question 16

If you select one marble randomly from a bag containing 18 red , 17 blue, and 12 green marbles, what is the probability of the marble being green?

1. 0,26
2. 0,38
3. 0,36

Question 17

"Empirically" means "based on - - - - -"

1. theory
2. statistical arguments
3. observations

Question 18

A construct may be a - - - - -

1. hypothetical relation between two or more variables
2. hypothetical aspect of humans that we wish to investigate
3. testable prediction derived from a theory of human behaviour

Question 19

"Arithmetic ability is measured by the number of simple sums a person can do correctly in two minutes". In this scenario "arithmetic ability" is - - - - -, and "the number of sums done correctly" is - - - - -

1. a manifest variable; an observable consequence
2. a factor; a hidden variable
3. a latent variable; an empirical consequence

Use the following scenario to answer **Questions 20 to 22**:

Ross' explanation of size perception in the natural environment indicates how the estimated size of a distant object is affected by its true size, distance from the observer, and transparancy of the atmosphere. He decides to investigate whether estimated size increases with haziness.

Question 20

"Estimated size increases with haziness" is - - - - -

1. an observed relation between two variables
2. a research hypothesis
3. an operational definition

Question 21

The dependent variable(s) in Ross' research is/are - - - - -

1. true size, distance from the observer, and transparancy of the atmosphere
2. haziness
3. estimated size

Question 22

The independent variable in Ross' research is - - - -

1. haziness
2. estimated size
3. size perception in the natural environment

Question 23

Suppose that over the years 10 000 students wrote the examinations in PYC 304-C and that 6000 of them passed, of which 300 obtained exactly 50%. This means that for randomly selected students the probability of obtaining exactly 50% is - - - - - while the probability of obtaining 50% or more is - - - - -

1. 0,60; 0,03
2. 0,05; 0,60
3. 0,03; 0,60

Question 24

A probability distribution of the ages in months of South African Grade 1 children indicates for each - - - - - what the corresponding - - - - - is.

1. child; age of that child
2. age in months; number of children of that age
3. age in months; relative frequency at that age

Question 25

Suppose the height of military recruits is distributed normally with a mean of 1750 mm and a standard deviation of 50 mm. Drawing repeated samples of 25 recruits each we expect the standard deviation of the sample means to be about - - - - - mm

1. 2
2. 10
3. 50

Questions 26 to 28 are based on the following case

Lisa is a human resource consultant and her boss asks her to test if the employees in their company (population A) have a more positive attitude towards work than the average worker in South Africa (population B). Lisa decides to use a standardized test which measures work attitude (a high score indicates a positive attitude) with a mean score of 120 for the population (population B).

Question 26

Which of the following statements translates the research hypothesis into the correct *statistical hypotheses*?

1. H_o: $\mu = 120$
   H_1: $\mu < 120$

2. H_o: $\mu = 120$
   H_1: $\mu > 120$

3. H_o: $\mu = 120$
   H_1: $\mu \neq 120$

Question 27

Lisa now wants to set up her sample data. Which of the following procedures should she follow?

She should draw - - - - -.

1. a random sample from both population A and B
2. a random sample from population A
3. two random samples from population A

Question 28

Lisa finds that the employees in her company obtained a score of 130. Which of the following statements is true about the result?

The employees in Lisa's company - - - - -

1. do not have a more positive attitude towards work and it is not needed to test this any further.
2. obviously have a more positive attitude towards work than employees of other companies and it is not necessary to test this difference statistically.
3. have a more positive attitude towards work than employees in other companies and she will have to test this difference further for significance.

Question 29

Peter stated the following hypothesis:

$H_0 : \mu = 100$
$H_1 : \mu > 100$

He drew a random sample of 50 persons and obtained a mean score of 105 and a standard deviation of 5. Given that the ***null hypothesis is true***, what would you expect the mean of the sample to have been?

1. 100
2. 105
3. More than 100

Question 30

Rejection of H_0 and acceptance of H_1 implies that a difference between the calculated sample mean and its expected value under H_0 is due to - - - - -

1. chance
2. the independent variable
3. sampling error

Question 31

The level of significance is a - - - - -.

1. p-value under H_0
2. special test statistic
3. type II error

Question 32

The size of the level of significance depends on - - - - -.

1. a choice made by the researcher
2. conventional rules
3. the p-value under H_0

Question 33

When two population means are compared, the p-value expresses - - - - -.

1. the chance that a difference found between the means is due to sampling error
2. the chance that a difference found between the means is due to H_1
3. the probability that a difference will be found between the means

Question 34

A failure to reject H_0 implies that a difference between the calculated sample mean and its expected value under H_0 is due to - - - - -.

1. the dependent variable
2. the independent variable
3. chance

Question 35

The level of significance is like a - - - - -.

1. p-value under H_0
2. p-value under H_1
3. p-value from the z-tables

Question 36

The level of significance of a study is set by the researcher to - - - - -.

1. control the type I error
2. control the type II error
3. control the p-value under H_0.

Question 37

When two population means are compared, the p-value expresses - - - - -.

1. the probability of the difference between the sample means given that H_0 is true
2. the probability of the difference between the sample means given that H_1 is true
3. the probability of the difference between the sample means given that H_0 is false

Question 38

Suppose the level of significance is set at 0,05, and the appropriate p-value is calculated as 0,04. What is the probability that the researcher will be making a Type I error should he decide to reject H_0 ?

1. 0,04
2. 0,05
3. Normally not possible to estimate

Question 39

Which of the following refers to the probability of making a Type II error?

1. Significance level
2. Beta or β
3. *p*- value

Question 40

What does it mean to say "the difference between the means of groups A and B is statistically significant"?

1. The sample result is more probable under the alternative hypothesis
2. The null hypothesis explains the sample result
3. The alternative hypothesis should be rejected

Question 41

Suppose a researcher selects a single sample of students and is interested in the proportion of students who prefer quantitative research over qualitative research. The population parameter of interest is - - - - - while the test statistic is - - - - -.

1. P ; z_p
2. p ; z_p
3. P ; p

Question 42

Consider the following statistical hypothesis:

$H_0 : P = 0,7$
$H_1 : P < 0,7$

If the sample proportion is found to be 0,6, the sample size is 21 and the z_p value is -1,0, what is the p-value?

1. 0,84
2. 0,16
3. 0,32

Question 43

Which of the following assumptions do we make when applying a statistical test?

1. That the null hypothesis is true
2. That the alternative hypothesis is true
3. That the null hypothesis is false

Question 44

When a statistical test yields a very small p-value, we know that the sample result is very - - - - -.

1. likely under the null hypothesis
2. unlikely under the alternative hypothesis
3. unlikely under the null hypothesis

Question 45

Suppose we have stated H_0: $\mu = 10$, and H_1: $\mu < 10$, and find that the sample mean corresponds to a z-score of 2.5. This means that the corresponding p-value - - - - -

1. is 0,0062
2. need not be found to reach a decision
3. cannot be found from the available information

Question 46

The hypothesis "H_1: μ is not equal to 50" is a - - - - - hypothesis and requires a - - - - - statistical test.

1. non-directional; one-tailed
2. non-directional; two-tailed
3. directional; two-tailed

Question 47

When applying a statistical test, if the p-value is smaller than the level of significance we - - - - - the null hypothesis.

1. accept
2. do not reject
3. reject

Base your answers to **Questions 48 to 50** on the following scenario:

To validate a new depression scale a researcher applies it to 50 patients diagnosed with depression and 50 patients diagnosed with stress. She predicts that the depression sample will score higher (more depression) than the stress sample. The mean scores of the two samples are found to be 30 (standard deviation 10) and 25 (standard deviation 10) respectively.

Question 48

Which is an appropriate alternative hypothesis for the analysis of the results?

1. $\mu > 25$
2. The population mean of the difference scores is larger than 25
3. $\mu_1 > \mu_2$

Question 49

Which is the appropriate test statistic to calculate?

1. The t-statistic for the difference between the means of two independent samples
2. The t-statistic for the difference between the means of two dependent samples
3. The z-statistic for the difference between the means of two independent samples

Question 50

What type of statistical test is required?

1. A one-tailed test
2. A two-tailed test
3. A two-directional test

Question 51

A researcher is comparing the following hypotheses:

H_0: $\mu_1 = \mu_2$
H_1: $\mu_1 > \mu_2$

Her results derived from a random sample shows that the mean sample score for the first group is less than the mean sample score for group two (i.e., $\bar{x}_1 < \bar{x}_2$). What may she conclude?

1. she needs to calculate the relevant p-value before making a conclusion
2. she can reject H_0
3. she cannot reject H_0

Question 52

A researcher plans to compare a group of male students with a group of female students on a test that measures problem-solving style. Which is the independent variable?

1. gender
2. problem-solving style
3. there is not enough information

Question 53

A large t-test statistic implies that - - - - -.

1. p will be large
2. p will be small
3. there is no relationship between p and the t-statistic

Question 54

Which is the appropriate test statistic to use to determine whether a linear relationship exists between two random variables?

1. t-test
2. chi-square test
3. Pearson's r test statistic

Question 55

As the sample size (n) increases - - - - -.

1. a smaller value of the Pearson correlation coefficient r will reach significance
2. a larger value of the Pearson correlation coefficient r is required before the result will be significant
3. there are no implications for the significance of the value of the Pearson correlation coefficient r

Question 56

A researcher wants to establish whether the type of employment category that is filled by employees of a particular company (manager, middle manager, clerical worker, technical worker) is at all influenced by their gender (male or female). Which would be the most appropriate test to use?

1. the t-test for two independent samples
2. Pearson's correlation test statistic
3. the chi-square (χ^2) test statistic

Question 57

The chi-square (χ^2) test statistic is used to compare

1. the distribution of observed data with the distribution of the data that is expected if the null hypothesis is true
2. the variance of observed data with the variance of the data as expected if the null hypothesis is true
3. the variance of each of two variables with the covariance of both

Question 58

Samples can be considered independent when - - - - -.

1. the composition of one sample is not systematically related to the composition of the other one
2. care was taken that the samples are drawn under different experimental conditions
3. the samples are drawn from more than a single population of subjects

Question 59

The difference score indicating differences between each pair of results in two samples ($d = X_2 - X_1$) is used in the calculation of the test statistic in the case of - - - - -.

1. the t-test for independent samples
2. the t-test for dependent samples
3. the Pearson correlation coefficient

Question 60

A researcher suspects that social phobia is more common among females than among males. She wants to test this by comparing the following hypotheses:

H_0: $\mu_1 = \mu_2$
H_1: $\mu_1 > \mu_2$

where μ_1 indicates the average level of social phobia among females in the population (group 1), as tested on a 7-point scale, and μ_2 is the average level of social phobia among males in the population (group 2). She draws random samples of females and males respectively, and gets the following average levels of social phobia scores for each group:

Females: $\bar{x}_1 = 4{,}1$; Males: $\bar{x}_2 = 4{,}8$

What may she conclude?

1. H_0 can be rejected
2. H_0 cannot be rejected
3. the relevant t-statistic and p-value must be calculated before making a conclusion

Question 61

Which of the following statements about the relationship between the value of the t-test statistic and the probability value p is true, if the sample size n remains constant?

1. The larger the value of the t-test statistic, the smaller p will be
2. The smaller the value of the t-test statistic, the smaller p will be
3. There is no relationship between p and the t-test statistic

Question 62

Which of the following does **not** represent a valid value for a Pearson's r:

1. 0,00
2. -1,00
3. 10,00

Question 63

A researcher wants to determine whether a relationship exists between students' general level of anxiety and their exam results. He presents each student from a random sample with a general anxiety scale just before they are to write an important exam. Which of the following is the most appropriate test statistic to use to determine whether a relationship exists between the two variables (anxiety level and exam results)?

1. t-test
2. Pearson's r test statistic
3. chi-square test (χ^2)

Question 64

What is the expected value for the bottom left cell (i.e., rural males) in the following contingency table, to be used in computing the chi-square (χ^2) test statistic?

	Male	Female	*Row total*
Urban	4	8	12
Rural	2	4	6
Column total	6	12	18

1. 4
2. 2
3. 8

Base your answers to **Questions 65 to 66** on the following scenario:

A marriage counsellor expects that second marriages more often end in divorce than first marriages. She tests this hypothesis by following up 200 marriages that were all registered five years ago, 50 in which at least one partner had been married before and 150 in which neither partner had been married before. Of the 150 first marriages 30 ended in divorce; of the 50 second marriages 10 ended in divorce.

Question 65

What is the researcher's operational definition of "divorced"?

1. The marriage ended in divorce
2. The marriage either ended in divorce or not
3. The marriage ended in divorce within five years

Question 66

What is the outcome of the analysis of the results?

1. The null hypothesis is rejected in favour of the alternative hypothesis
2. The null hypothesis is not rejected
3. The alternative hypothesis is not rejected

Question 67

A politician asks his audience of 100 whether they will vote for him. Of the 60 men present 33 say yes; of the 40 women present 18 say yes. When analysing these results the two sets of answers should be regarded as - - - - -

1. coming from the same population
2. independent
3. having been randomly assigned to the two groups

Question 68

A negative correlation between variables X and Y implies that persons scoring low on X will generally score - - - - - on Y.

1. low
2. either low or high
3. high

Question 69

Which of the following can never be exactly zero?

1. a probability
2. a level of significance
3. a correlation coefficient

Question 70

Which of the following can never have a value of -0,5?

1. The chi-square statistic
2. The z-statistic
3. The Pearson correlation coefficient

[TOTAL: 70]

END OF EXAM PAPER

NB: Your mark out of 70 will be converted to a percentage (100 marks) by the computer.