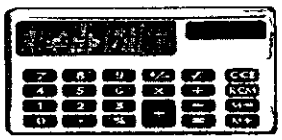
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

PYC3704 (470182) May/June 2016

PSYCHOLOGICAL RESEARCH

Duration 2 Hours 70 Marks

EXAMINATION PANEL AS APPOINTED BY THE DEPARTMENT

Use of a non-programmable pocket calculator is permissible.

Closed book examination

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EXAMINERS.

FIRST:	**PROF P KRUGER**	**PROF HC JANEKE**
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This paper consists of 17 pages plus 2 blank pages for rough work (pp 18 & 19) plus 1 page (i) of formulae and 4 pages of tables (ii-v) as well as instructions for the completion of a mark reading sheet

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After completing your answers, you must hand in the following

(i) The mark reading sheet
(ii) The question paper (All the pages must be handed in)

This exam paper consists of seventy items Your mark will be converted to a mark out of 80 and 20% of your year mark (from the assignments) will be added, to produce a mark out of 100 [Note however, that if your exam mark is less than 40% the year mark will not be added]

ENSURE THAT YOU HAVE WRITTEN YOUR **STUDENT NUMBER** AND **COURSE CODE** ON THE MARK READING SHEET

Please complete the attendance register on the back page, tear off and hand to the invigilator

[TURN OVER]

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

Question 1

A theory can be described as an interdependent set of - - - - - relations between - - - - -

1 proposed, constructs
2 empirical, hypotheses
3 verified, variables

Question 2

A measurement model of *attention deficit disorder* relates this - - - - - to its - - - - -

1 construct, intervening variables
2 hypothetical variable, observable instances
3 variable, parameters

Use the following scenario to answer Questions 3 to 5

"Acute stress disorder among patients who suffer from this disorder can be explained in terms of how the intensity of stress is affected by personality factors, by the nature of the stressors which they experience, and by the support they experience in their social system My research will investigate whether the level of anxiety of these patients can be reduced by providing social support through group therapy More specifically, patients receiving group therapy are expected to score lower on the Manifest Anxiety Scale than patients not receiving therapy "

Question 3

"Acute stress disorder among patients who suffer from this disorder can be explained in terms of how the intensity of stress is affected by personality factors, by the nature of the stressors which they experience, and by the support they experience in their social system " is a(n) - - - - -

1 hypothesis
2 theory
3 operational definition

Question 4

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

1 personality factors, nature of stressors, support received
2 whether or not group therapy is received
3 level of anxiety experienced by patients

Question 5

When interpreting the results of this research I will assume that personality factors and the nature of the stressors - - - - -

1 do affect level of anxiety, but their effects more or less cancel out over all my patients in the research sample
2 do not affect level of anxiety
3 do affect level of anxiety, but according to the central limit theorem their average effect will be zero

Question 6

A psychologist conducts a study in which she measures the reaction times of students doing a psychometric test She proceeds from the assumption that a fast reaction time is a good indication of high intelligence In this study 'intelligence' is the - - - - - variable

1 operational
2 latent
3 manifest

Use the following scenario to answer Questions 7 and 8

Jeff's explanation of size perception in the natural environment states that the estimated size of a distant object is affected by its true size, distance from the observer, and transparency of the atmosphere He decides to investigate whether the claim that estimated size increases with haziness is valid

Question 7

The statement "estimated size increases with haziness" represents the - - - - -

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

Question 8

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

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

Question 9

In a study, the relationship between level of physiological arousal (high and low) and mood (measured on three levels) is considered A suitable hypothesis for the study can be viewed as a - - - - -

1 rule associating the values of 'physiological arousal' with the values of 'mood'
2 correlation between the constants 'physiological arousal' and 'mood'
3 procedure to make it possible to measure the values of the variables 'physiological arousal' and 'mood'

Question 10

Assume that a researcher believes that education plays a role in promotion He intends to investigate this on a sample of workers at Computer Solutions Inc Which one of the following is the *most appropriate* statement of the operational hypothesis?

1 Education is relevant to 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 education at corresponding post levels

Question 11

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

1 0, 1
2 1, 0
3 1, 10

Question 12

Consider the hypothesis

There is a relationship between self-esteem and eating disorders People with low self-esteem are more likely to have eating disorders because they tend to have less healthy eating habits than people with high self-esteem

Suppose that μ_{hs} indicates be the average of a measurement on a scale that measures 'healthy eating patterns' (where a higher score means a person exhibits more healthy eating habits), for people with high self-esteem, and μ_{ls} the average eating pattern score for people with low self-esteem Which of the following is an appropriate way to state the hypothesis in symbolic form?

1 $\mu_{hs} \neq \mu_{ls}$
2 $\mu_{hs} > \mu_{ls}$
3 $\mu_{hs} < \mu_{ls}$

Question 13

Which of the options represents a valid description of the law of large numbers?

1 As repetitions of a probability experiment increases, the relative frequency or proportion of outcomes will approximate the most probable outcome or theoretical probability
2 All probability distributions approach the normal distribution as the sample size increases
3 For a random sample of size n selected from a population with mean μ and standard deviation σ, the sampling distribution of means obtained from all possible samples is approximately normal with mean μ and standard deviation $\sigma/\sqrt{n}$

Question 14

Suppose that over the years 10 000 students wrote an examination in a specific course, and that 6400 of them passed, of which 200 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 64, 0 02
2 0 05, 0 64
3 0 02, 0 64

Question 15

During the interpretation of psychological measurements the normal distribution is often - - - - -

1 adapted to fit the observed frequency distribution of scores
2 used as a theoretical model for interpreting the observed distribution of scores
3 used to calculate the relative frequency of observed scores

Question 16

Joseph scores 62% in a History test (class mean 60%, standard deviation 10%) and 54% in a Biology test (class mean 60%, standard deviation 12%) Use z-scores to decide which statement is true

Relative to the rest of his class Joseph does - - - - -

1 better in History that in Biology
2 better in Biology than in History
3 equally well in History and Biology

Question 17

A *frequency distribution* of the ages in months of a class of Grade 1 children indicates for each - - - - - what the corresponding - - - - - is

1 frequency, age in months
2 age in months, number of children of that age
3 age in months, relative frequency at that age

Base your answers to Questions 18 and 19 on the following scenario

A researcher is investigating job satisfaction of workers at a branch office of a particular company The distribution of staff at this office is as follows

Managerial Section	5
Administrative Section	15
Technical Section	10
Human Resources Section	6

In order to conduct an interview, the researcher draws the name of a staff member at random

Question 18

What is the probability that the person selected would be in the Administration Section?

1 0 07
2 0 42
3 0 25

Question 19

What is the probability that a worker whose name is selected at random is from the Managerial Section OR from the Human Resources Section?

1 0 31
2 0 06
3 0 4

Question 20

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, probability of a Grade 1 child having that age

Question 21

Vusi is conducting research into the ability of people to recognize faces from photographs

A random sample of research participants are shown a group photo which they are allowed to look at for ten minutes Each participant is then shown ten individual photographs, and asked whether the person on the photo was in the group photo The table represents a frequency distribution of the number photos that were identified correctly by the research participants

Number of correct responses	0	1	2	3	4	5	6	7	8	9	10
Frequency count of participants	0	1	4	11	14	18	22	17	9	6	0

Based on this data, what is the probability be that a person who is selected at random would correctly identify 7 or more faces from the group photo?

1 0 07
2 0 15
3 0 32

Question 22

John received 55 marks for his psychology test The average mark for this test is 63, and the standard deviation is 8 What proportion of the students received higher marks than John?

1 0 16
2 0 84
3 0 34

Question 23

The *asymptotic* property of the normal curve refers to the fact that - - - - -

1 the curve is symmetrical and bell-shaped
2 the endpoints of the curve get closer to, but never touch, the horizontal axis
3 the curve represents a distribution of data that was standardized to a mean of 0 and a standard deviation of 1

Question 24

The central limit theorem states that the - - - - -

1 sampling distribution of a specific variable will approach a normal distribution as the size of the sample increases
2 sampling error will gradually assume a normal distribution for larger samples
3 distribution of the mean of a large number of samples of a specific variable will be approximately normal, regardless of the underlying distribution of the variable

Question 25

When testing a hypothesis, the p-value represents the probability that we would find the specific relationship between variables that we see in our measurements, given that the - - - - -

1 null hypothesis is false
2 alternative hypothesis is true
3 null hypothesis is true

Question 26

When a research hypothesis is formally expressed as a statistical hypothesis, it should be expressed in terms of - - - - -

1 population parameters
2 sample statistics
3 both of the above

Question 27

When comparing an observed sample mean with a given population mean, the rejection of H_0 implies that a difference between the calculated sample mean and its expected value under H_0 is probably due to - - - - -

1 chance
2 the independent variable
3 sampling error

Question 28

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 -3 This means that the corresponding p-value is equal to - - - - -

1 0 9987
2 0 4987
3 0 0013

Question 29

A researcher wants to determine the effectiveness of an assertiveness training course She tests a sample of 200 participants before and after the workshop on a scale which measures assertiveness, and finds mean scores of $\bar{x}_1 = 4\ 5$ before and $\bar{x}_2 = 5\ 7$ after the workshop A statistical test shows that this difference is statistically significant The scores are however fairly close together and she is concerned that the result may be due to the relatively large sample size What can she do to check whether the result is also fairly important in practical terms? She should - - - - -

1 calculate the power of the test
2 determine the level of significance of the result
3 calculate the effect size

Question 30

How is the significance level (α) of a statistical test determined? It is - - - - -

1 looked up in the z-tables
2 selected by the researcher
3 calculated from the test statistic

Question 31

A Type II error occurs when the - - - - -

1 null hypothesis is not rejected when it should be rejected
2 null hypothesis is rejected when it should not be rejected
3 alternative hypothesis is rejected instead of the null hypothesis

Question 32

When applying a statistical test, we - - - - - the null hypothesis if the p-value is - - - - - or equal to the level of significance

1 reject, greater
2 accept, smaller
3 reject, smaller

Base your answers to Questions 33 and 34 on the following hypothesis

"The mean extroversion score on the Eysenck Personality Questionnaire (EPQ) of women who support abortion is higher than that of women who oppose it "

Question 33

The hypothesis indicates how the constructs - - - - -

1 are operationalized
2 are related
3 differ

Question 34

The two constructs of importance in the hypothesis are - - - - - and - - - - -

1 gender , personality
2 extroversion , whether a woman supports abortion or not
3 whether abortion is supported or not , gender

Question 35

The alternative hypothesis is often a re-statement of the - - - - - hypothesis

1 statistical
2 research
3 null

Question 36

Suppose that the memory span of adults is normally distributed with a mean of 7 items and a standard deviation of 2 items A researcher predicts that *dyslexic adults have a shorter memory span than adults in general*

Which of the following is an appropriate alternative hypothesis for testing this prediction?

1 The mean memory span of the population of dyslexic adults is smaller than 7
2 The mean memory span of the population of adults is not equal to 7
3 The mean memory span of the population of dyslexic adults equals 7

Question 37

If a p-value on a computer printout is reported as '0 0000', what should a researcher assume? It implies that the value can be interpreted as - - - - -

1 smaller than 0 00001
2 equal to exactly zero
3 too small to calculate

Question 38

Which of the following statement about a null hypothesis is NOT valid? The null hypothesis is a statement of what may be expected if - - - - -

1 there are significant relationships among constructs or variables
2 there are no relationships among variables in the research question
3 all relationships among constructs are due to chance or measurement error

Question 39

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 40

The larger that a value which a researcher chooses as the level of significance is, the greater the probability of - - - - -

1 a type I error
2 a type II error
3 not rejecting the null hypothesis

Question 41

Which of the following symbols is used to indicate the probability of making a Type II error?

1 Alpha or α
2 Beta or β
3 Cohen's d

Question 42

Which one of the following alternative hypotheses would require a one-tailed test of significance?

1 The mean anxiety score for boys differs from the mean score for girls
2 The mean verbal ability score for boys is lower than the mean verbal ability score for girls
3 There is a significant correlation between the test marks for English and marks for Mathematics for a mixed group of boys and girls

Question 43

Suppose we want to increase the ability of a statistical test to detect a significant result Which of the following options would NOT be helpful?

1 Increase the sample size
2 Decrease sampling error, measurement error, etc
3 Set a smaller level of significance

Question 44

The *power* of a statistical test indicates the - - - - -

1 sensitivity or 'accuracy' of the test to determine whether an effect exists
2 whether a result is of practical importance, even though it may be significant
3 probability of making a Type I error

Question 45

Suppose H_0 $\mu = 100$ are tested against H_1 $\mu \neq 100$ at the 0 10 level of significance If the t-statistic is -3 20 and the two-tailed p-value is 0 11, what decision regarding the statistical hypothesis should be taken?

1 Reject H_0 and accept H_1 at the 0 10 level of significance
2 Reject H_1 and accept H_0 at the 0 11 level of significance
3 Do not reject H_0 at the 0 10 level of significance

Base your answers to Questions 46 to 49 on the following scenario

An educational psychologist is doing research on numeracy and has drawn a sample of university students enrolled for research methodology It is known that the population average on a psychometric test of Numeracy equals 100, but she believes that the average numeracy level of these students will be higher than the population average She sets a level of significance of $\alpha = 0\ 05$

Question 46

Select the correct formulation of the hypothesis in this study

1 H_0 $\mu \neq 100$, H_1 $\mu \geq 100$
2 H_0 $\mu = 100$, H_1 $\mu \neq 100$
3 H_0 $\mu = 100$, H_1 $\mu > 100$

Question 47

The hypothesis requires a - - - - - statistical test

1 directional
2 non-directional
3 two-tailed

Question 48

Suppose the researcher finds after statistical analysis that the average numeracy level in her sample is 105 with a standard deviation of 8 Which test statistic should she use to see if the difference is significant?

1 $t_{\bar{x}}$
2 $z_{\bar{x}}$
3 t_c

Question 49

The researcher calculates the test statistic, and finds that the p-value associated with the resultant statistic is 0 062 Based on the scenario above, what conclusion can the researcher make regarding her hypothesis?

1 The average numeracy of the students is significantly higher than the population average
2 The average numeracy of the students is not significantly higher than the population average
3 The population average differs significantly from the average numeracy of the students

Question 50

Consider the following statistical hypotheses

H_0 $\mu = 60$
H_1 $\mu \neq 60$

Suppose the one-tailed p-value is 0 0345 and the level of significance is set at 0 05 The sample mean was found to be 65 What is the value of the two-tailed or non-directional p-value?

1 0 10
2 0 0173
3 0 0690

Base your answers to Questions 51 to 53 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 on the scale (implying more depression) than the stress sample The mean scores of the two samples are found to be $\bar{x}_{Depression} = 30$ with a standard deviation of 12 for the depression group and $\bar{x}_{Stress} = 25$ with a standard deviation 10 for the stress group

Question 51

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

1 $\mu_{Stress} < \mu_{Depression}$
2 $\mu_{Depression} \neq \mu_{Stress}$
3 $\mu_{Stress} > \mu_{Depression}$

Question 52

What type of statistical test is required?

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

Question 53

Given the information in the scenario above, which of the following assumptions need to be made before calculating the test statistic?

1. The population standard deviation is known
2 The two populations have different means
3 The two populations have the same variance

Question 54

A researcher suspects that the average level of social engagement (need to interact socially) is higher among females than among males She wants to test this by comparing the following hypotheses

H_0 $\mu_F = \mu_M$
H_1 $\mu_F > \mu_M$

where μ_F indicates the average level of social engagement among females in the population, as tested on a 7-point scale, and μ_M is the average level of social engagement among males in the population She draws random samples of females and males respectively, and calculates the following mean levels of social engagement scores for each group

Females $\bar{x}_F = 4\ 1$, Males $\bar{x}_M = 4\ 8$

What can the researcher infer from these observations?

1 H_0 can be rejected
2 H_0 cannot be rejected
3 It is necessary to do a t-test to determine whether the difference is significant

Question 55

A *standard error* refers to the extent - - - - -

1 to which sample means are distributed around the actual mean of the sampling distribution
2 to which the sample standard deviation differs from the population standard deviation
3 of the error one would make if you reject the null hypothesis falsely

Question 56

The use of the t_c test to compare the means of data from two independent samples of moderate size is appropriate when - - - - -

(a) the samples come from populations that are normally distributed
(b) the population variances are equal

1 (b) but not (a)
2 (a) but not (b)
3 (a) and (b)

Base your answers to Questions 57 and 58 on the following scenario

An educational psychologist wants to know if learners will do significantly better on a test which measures reasoning skills if they take the same test again She gives the test to a group of 100 grade twelve learners, and after an interval of two months she gives the same test to these same learners

Question 57

What assumption should the educational psychologist make when she tests her hypothesis for statistical significance?

The samples of measurements from the first and second instances when the test was taken are - - - - -

1 not correlated
2 independent
3 dependent

Question 58

Which test statistic is appropriate to test the difference between the first and second test for statistical significance?

2 The test statistic based on Pearson's *r*
3 The t_d test statistic
3 The t_c test statistic

Question 59

When evaluating a t-test for the comparison of two group means, what does it mean to say "the difference between the means of two groups is statistically significant"?

1 If the null hypothesis were true, the results which were found in the sample data would be unlikely
2 The null hypothesis gives an adequate description of the relationships between the means
3 The results which were found in the sample data would be unlikely if the alternative hypothesis is true

Question 60

A graph which shows the extent to which a measurement of one variable is related to a measurement on another variable for variables measured on a ratio or interval scale is called a - - - - -

1 histogram
2 scatter plot
3 contingency diagram

Question 61

If the relationship between two variables where a person scoring low on one variable is most likely to score high on the other is determined with a Pearson's correlation coefficient, the value of r is likely to be - - - - - -.

1 higher than zero
2 less than zero
3 close to zero

Question 62

A researcher obtains a correlation coefficient of 0 40 between a test for verbal intelligence and a test for non-verbal intelligence based on a random sample of 10 people He decides to confirm his findings by giving the same two tests to a different random sample of 100 people from the same population Once again he finds that the correlation coefficient is 0 40 Which of these two calculated correlation coefficients is more likely to differ significantly from zero under the null hypothesis?

1 That obtained on the larger sample
2 Both are equally likely to be significant
3 That obtained on the smaller sample

Question 63

A researcher wants to establish whether a relationship exists between people's religious affiliation (out of a list of different religions) and whether they are in favour of or against the death penalty Which of the following 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

Question 64

What is the correlation coefficient between the following values of X and Y likely to be?

X	1	1	1	1	1	1
Y	-15	0	12	-8	10	0

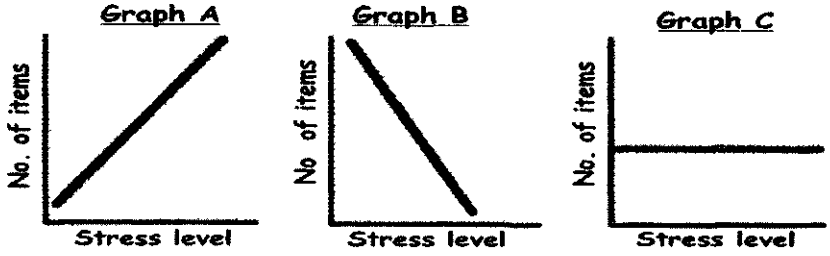
1 -1
2 0
3 +1

Base your answers to Questions 65 and 66 on the following scenario

A researcher believes that stress level interferes with people's ability to remember She gives a list of items to be memorized to a sample of research participants While they memorize the items, various disturbances which cause distraction (for example noise, telephone calls, people entering the room and talking loudly) are deliberately introduced After they were given a set amount of time to memorize the list, each participant's stress level is measured (on a scale where a larger number implies a higher level of stress), and a note is made of the number of items they remember correctly

Question 65

The researcher draws a graph of the relationship between level of stress and number of items remembered If her expectations are correct, which of the following graphs is she likely to find?



1 Graph A
2 Graph B
3 Graph C

Question 66

The researcher calculates the Pearson product moment correlation coefficient of the relationship between stress level and number of items remembered Which of following expressions would best represent the relationship between level of stress and memory if the researcher's suspicion about the relationship is true?

1 $r > 0$
2 $r \neq 0$
3 $r < 0$

Question 67

Which of the following does NOT represent a valid value for a chi-square (χ^2) test statistic?

1 0 00
2 10 00
3 -1 00

Question 68

If there is no relationship at all between two variables, what would be the most likely value of Pearson's correlation coefficient r, out of the following?

1 -1 0
2 0 0
3 0 5

Question 69

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

1 the frequency distribution of observed data with the frequency distribution of the data as 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 extent to which two variables X and Y varies together in relation to the variance of each of them

Question 70

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	3	9	12
Rural	3	3	6
Column total	6	12	18

1 3
2 2
3 6

[TOTAL 70]

END OF EXAM PAPER

List of formulae:

$$\frac{\bar{x}-\mu_{\bar{x}}}{\sigma_{\bar{x}}}=\frac{(\bar{x}-\mu)}{\frac{\sigma}{\sqrt{n}}}$$

$$\frac{(\bar{x}-\mu)}{s_{\bar{x}}}=\frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}}$$

$$\frac{(\bar{x}_1-\bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}$$

$$\frac{\bar{d}-\bar{D}}{s_{\bar{d}}/\sqrt{n}}=\frac{\bar{d}}{s_{\bar{d}}/\sqrt{n}} \qquad (if\ \bar{D}=0)$$

$$\frac{cov(x,y)}{\sqrt{var(x)\,var(y)}}=\frac{n\Sigma xy-(\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2-(\Sigma x)^2][n\Sigma y^2-(\Sigma y)^2]}}$$

$$\sum_{ij}\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$$

$$\frac{x-\bar{x}}{s} \quad or \quad \frac{x-\mu}{\sigma}$$

$$\sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

$$\frac{\bar{x}_1-\bar{x}_2}{s_p}$$

Appendix: Probabilities associated with the standard normal distribution (z)

z	Mean to z	Larger portion	Smaller portion	z	Mean to z	Larger portion	Smaller portion
0.00	0.0000	0.5000	0.5000	0 51	0 1950	0.6950	0.3050
0.01	0.0040	0 5040	0 4960	0 52	0.1985	0.6985	0 3015
0 02	0 0080	0 5080	0.4920	0.53	0 2019	0 7019	0.2981
0.03	0.0120	0.5120	0.4880	0.54	0.2054	0 7054	0 2946
0 04	0.0160	0 5160	0.4840	0 55	0 2088	0.7088	0.2912
0 05	0.0199	0 5199	0.4801	0.56	0.2123	0 7123	0.2877
0 06	0.0239	0 5239	0 4761	0.57	0.2157	0 7157	0 2843
0 07	0 0279	0 5279	0 4721	0.58	0.2190	0.7190	0.2810
0 08	0.0319	0 5319	0.4681	0.59	0.2224	0 7224	0 2776
0.09	0.0359	0.5359	0.4641	0 60	0.2257	0.7257	0.2743
0.10	0.0398	0.5398	0 4602	0 61	0.2291	0.7291	0.2709
0.11	0.0438	0.5438	0.4562	0 62	0 2324	0.7324	0.2676
0.12	0.0478	0.5478	0 4522	0 63	0 2357	0.7357	0.2643
0 13	0.0517	0.5517	0.4483	0.64	0.2389	0.7389	0.2611
0 14	0.0557	0 5557	0.4443	0.65	0.2422	0 7422	0.2578
0.15	0.0596	0.5596	0.4404	0.66	0 2454	0.7454	0.2546
0.16	0 0636	0 5636	0.4364	0.67	0 2486	0.7486	0.2514
0.17	0.0675	0.5675	0 4325	0.68	0.2517	0.7517	0.2483
0 18	0.0714	0.5714	0.4286	0.69	0.2549	0.7549	0.2451
0.19	0.0753	0 5753	0.4247	0.70	0.2580	0.7580	0.2420
0.20	0.0793	0 5793	0 4207	0 71	0.2611	0.7611	0.2389
0.21	0.0832	0.5832	0.4168	0 72	0.2642	0.7642	0 2358
0 22	0.0871	0.5871	0.4129	0.73	0 2673	0 7673	0.2327
0 23	0.0910	0.5910	0.4090	0.74	0.2704	0.7704	0.2296
0.24	0.0948	0 5948	0.4052	0.75	0 2734	0.7734	0 2266
0.25	0 0987	0.5987	0.4013	0 76	0.2764	0.7764	0.2236
0 26	0.1026	0 6026	0.3974	0.77	0.2794	0.7794	0.2206
0.27	0.1064	0.6064	0.3936	0 78	0.2823	0.7823	0.2177
0.28	0.1103	0.6103	0 3897	0 79	0.2852	0.7852	0.2148
0.29	0.1141	0 6141	0.3859	0.80	0 2881	0.7881	0.2119
0.30	0.1179	0 6179	0 3821	0 81	0 2910	0.7910	0 2090
0 31	0.1217	0.6217	0.3783	0.82	0.2939	0.7939	0 2061
0 32	0.1255	0 6255	0.3745	0 83	0 2967	0.7967	0 2033
0 33	0 1293	0.6293	0.3707	0.84	0 2995	0.7995	0.2005
0.34	0.1331	0 6331	0.3669	0.85	0.3023	0.8023	0 1977
0 35	0 1368	0.6368	0.3632	0 86	0.3051	0.8051	0.1949
0.36	0.1406	0.6406	0 3594	0.87	0.3078	0.8078	0.1922
0.37	0.1443	0.6443	0.3557	0.88	0.3106	0.8106	0.1894
0 38	0.1480	0.6480	0.3520	0.89	0.3133	0.8133	0.1867
0 39	0 1517	0.6517	0 3483	0 90	0 3159	0.8159	0.1841
0.40	0.1554	0.6554	0.3446	0.91	0.3186	0.8186	0.1814
0.41	0.1591	0.6591	0.3409	0.92	0.3212	0.8212	0.1788
0.42	0 1628	0.6628	0.3372	0 93	0 3238	0.8238	0.1762
0 43	0 1664	0 6664	0.3336	0.94	0.3264	0.8264	0.1736
0 44	0.1700	0 6700	0.3300	0.95	0.3289	0 8289	0.1711
0.45	0 1736	0.6736	0.3264	0 96	0 3315	0.8315	0 1685
0.46	0.1772	0.6772	0.3228	0.97	0.3340	0 8340	0 1660
0 47	0 1808	0 6808	0.3192	0.98	0 3365	0 8365	0.1635
0.48	0.1844	0.6844	0.3156	0 99	0.3389	0.8389	0 1611
0 49	0.1879	0.6879	0.3121	1.00	0.3413	0.8413	0 1587
0 50	0.1915	0.6915	0.3085	1.01	0 3438	0 8438	0.1562

Appendix: Probabilities associated with the standard normal distribution (z) continued

z	Mean to z	Larger portion	Smaller portion	z	Mean to z	Larger portion	Smaller portion
1.02	0.3461	0 8461	0 1539	1 53	0.4370	0.9370	0.0630
1.03	0 3485	0 8485	0 1515	1 54	0 4382	0.9382	0.0618
1.04	0.3508	0.8508	0.1492	1.55	0.4394	0 9394	0.0606
1.05	0.3531	0.8531	0.1469	1.56	0.4406	0 9406	0.0594
1 06	0.3554	0.8554	0.1446	1 57	0.4418	0.9418	0.0582
1.07	0 3577	0 8577	0 1423	1 58	0.4429	0.9429	0.0571
1.08	0.3599	0.8599	0 1401	1.59	0 4441	0.9441	0.0559
1 09	0.3621	0.8621	0.1379	1.60	0.4452	0.9452	0.0548
1 10	0.3643	0.8643	0 1357	1 61	0.4463	0.9463	0.0537
1 11	0.3665	0.8665	0 1335	1 62	0.4474	0.9474	0.0526
1.12	0.3686	0.8686	0.1314	1 63	0.4484	0 9484	0 0516
1 13	0 3708	0 8708	0.1292	1.64	0 4495	0.9495	0.0505
1.14	0 3729	0 8729	0.1271	1.65	0.4505	0.9505	0 0495
1.15	0.3749	0.8749	0.1251	1.66	0.4515	0.9515	0.0485
1.16	0.3770	0.8770	0.1230	1.67	0.4525	0.9525	0.0475
1 17	0.3790	0.8790	0 1210	1 68	0.4535	0.9535	0.0465
1.18	0 3810	0.8810	0.1190	1 69	0.4545	0.9545	0.0455
1.19	0 3830	0.8830	0.1170	1 70	0.4554	0 9554	0.0446
1 20	0 3849	0 8849	0.1151	1.71	0.4564	0.9564	0.0436
1.21	0 3869	0 8869	0 1131	1 72	0.4573	0.9573	0.0427
1.22	0 3888	0 8888	0.1112	1.73	0 4582	0.9582	0.0418
1.23	0 3907	0.8907	0.1093	1.74	0.4591	0.9591	0.0409
1 24	0 3925	0.8925	0.1075	1.75	0.4599	0.9599	0.0401
1 25	0.3944	0.8944	0.1056	1.76	0.4608	0.9608	0.0392
1.26	0.3962	0.8962	0.1038	1.77	0.4616	0.9616	0.0384
1.27	0.3980	0.8980	0.1020	1.78	0 4625	0.9625	0.0375
1 28	0.3997	0.8997	0 1003	1 79	0 4633	0.9633	0.0367
1.29	0.4015	0.9015	0 0985	1.80	0.4641	0.9641	0.0359
1.30	0.4032	0.9032	0.0968	1.81	0.4649	0 9649	0.0351
1 31	0.4049	0.9049	0.0951	1.82	0.4656	0 9656	0 0344
1 32	0 4066	0.9066	0 0934	1 83	0.4664	0 9664	0 0336
1.33	0.4082	0.9082	0.0918	1.84	0.4671	0.9671	0.0329
1 34	0.4099	0.9099	0.0901	1 85	0 4678	0.9678	0 0322
1 35	0.4115	0 9115	0.0885	1.86	0.4686	0 9686	0 0314
1 36	0.4131	0 9131	0 0869	1 87	0.4693	0.9693	0 0307
1 37	0 4147	0.9147	0 0853	1.88	0.4699	0.9699	0 0301
1.38	0.4162	0.9162	0.0838	1 89	0.4706	0.9706	0.0294
1.39	0.4177	0 9177	0.0823	1 90	0.4713	0 9713	0.0287
1.40	0.4192	0 9192	0.0808	1.91	0.4719	0.9719	0.0281
1 41	0.4207	0 9207	0 0793	1.92	0.4726	0.9726	0 0274
1 42	0.4222	0.9222	0.0778	1.93	0.4732	0.9732	0 0268
1 43	0.4236	0.9236	0 0764	1.94	0.4738	0.9738	0.0262
1 44	0.4251	0.9251	0.0749	1.95	0.4744	0.9744	0.0256
1 45	0 4265	0 9265	0.0735	1.96	0 4750	0.9750	0 0250
1 46	0.4279	0.9279	0 0721	1.97	0 4756	0.9756	0.0244
1.47	0.4292	0.9292	0 0708	1.98	0.4761	0.9761	0.0239
1 48	0.4306	0.9306	0 0694	1.99	0 4767	0 9767	0.0233
1.49	0.4319	0.9319	0 0681	2.00	0.4772	0 9772	0.0228
1.50	0 4332	0.9332	0.0668	2 01	0 4778	0 9778	0 0222
1.51	0.4345	0.9345	0.0655	2.02	0 4783	0.9783	0 0217
1.52	0.4357	0.9357	0.0643	2.03	0 4788	0.9788	0.0212

Appendix: Probabilities associated with the standard normal distribution (z) continued

z	Mean to z	Larger portion	Smaller portion	z	Mean to z	Larger portion	Smaller portion
2 04	0 4793	0 9793	0.0207	2.55	0.4946	0.9946	0.0054
2 05	0.4798	0.9798	0.0202	2.56	0.4948	0.9948	0.0052
2 06	0.4803	0.9803	0.0197	2 57	0.4949	0.9949	0 0051
2 07	0 4808	0.9808	0.0192	2 58	0.4951	0.9951	0.0049
2 08	0.4812	0 9812	0.0188	2.59	0 4952	0.9952	0.0048
2.09	0.4817	0 9817	0.0183	2.60	0 4953	0.9953	0 0047
2 10	0 4821	0 9821	0.0179	2 61	0.4955	0.9955	0.0045
2.11	0.4826	0.9826	0 0174	2 62	0.4956	0 9956	0.0044
2 12	0 4830	0.9830	0.0170	2.63	0.4957	0.9957	0.0043
2.13	0.4834	0 9834	0.0166	2.64	0 4959	0.9959	0 0041
2 14	0.4838	0 9838	0 0162	2 65	0.4960	0.9960	0.0040
2 15	0 4842	0.9842	0 0158	2 66	0.4961	0.9961	0.0039
2.16	0.4846	0 9846	0.0154	2.67	0.4962	0.9962	0.0038
2.17	0.4850	0.9850	0.0150	2.68	0 4963	0.9963	0 0037
2.18	0 4854	0.9854	0 0146	2 69	0.4964	0.9964	0.0036
2.19	0.4857	0.9857	0.0143	2 70	0 4965	0.9965	0 0035
2.20	0 4861	0 9861	0 0139	2 71	0 4966	0.9966	0 0034
2 21	0.4864	0.9864	0 0136	2 72	0.4967	0.9967	0.0033
2 22	0.4868	0.9868	0 0132	2.73	0 4968	0 9968	0 0032
2.23	0.4871	0.9871	0.0129	2.74	0 4969	0.9969	0.0031
2.24	0 4875	0 9875	0 0125	2 75	0.4970	0.9970	0.0030
2.25	0.4878	0.9878	0 0122	2.76	0 4971	0.9971	0 0029
2.26	0.4881	0.9881	0.0119	2.77	0 4972	0.9972	0.0028
2.27	0 4884	0 9884	0.0116	2.78	0.4973	0.9973	0.0027
2.28	0.4887	0.9887	0.0113	2.79	0.4974	0.9974	0.0026
2.29	0 4890	0.9890	0.0110	2.80	0.4974	0.9974	0.0026
2.30	0.4893	0 9893	0.0107	2.81	0 4975	0.9975	0.0025
2.31	0.4896	0 9896	0 0104	2.82	0.4976	0.9976	0 0024
2.32	0 4898	0 9898	0.0102	2.83	0 4977	0 9977	0.0023
2.33	0.4901	0.9901	0.0099	2.84	0.4977	0.9977	0.0023
2 34	0.4904	0.9904	0.0096	2.85	0.4978	0.9978	0 0022
2.35	0 4906	0.9906	0 0094	2 86	0.4979	0 9979	0.0021
2 36	0 4909	0.9909	0.0091	2.87	0.4979	0.9979	0.0021
2 37	0 4911	0 9911	0.0089	2 88	0 4980	0.9980	0.0020
2.38	0.4913	0.9913	0 0087	2 89	0 4981	0 9981	0.0019
2.39	0 4916	0.9916	0.0084	2.90	0.4981	0 9981	0 0019
2 40	0.4918	0.9918	0.0082	2.91	0.4982	0.9982	0.0018
2 41	0.4920	0.9920	0.0080	2.92	0 4982	0.9982	0.0018
2.42	0.4922	0.9922	0 0078	2 93	0.4983	0.9983	0.0017
2.43	0.4925	0.9925	0 0075	2.94	0.4984	0.9984	0.0016
2.44	0.4927	0.9927	0 0073	2.95	0.4984	0.9984	0.0016
2 45	0.4929	0.9929	0 0071	2.96	0 4985	0.9985	0 0015
2 46	0.4931	0.9931	0 0069	2.97	0.4985	0 9985	0 0015
2.47	0 4932	0.9932	0.0068	2.98	0.4986	0.9986	0.0014
2 48	0.4934	0 9934	0.0066	2.99	0 4986	0.9986	0.0014
2 49	0.4936	0 9936	0 0064	3.00	0.4987	0 9987	0.0013
2.50	0 4938	0.9938	0.0062	3.01	0.4987	0.9987	0.0013
2 51	0.4940	0 9940	0.0060	3.02	0 4987	0.9987	0.0013
2.52	0.4941	0.9941	0 0059	3.03	0 4988	0.9988	0 0012
2.53	0.4943	0.9943	0 0057	3 04	0.4988	0.9988	0.0012
2.54	0 4945	0.9945	0.0055	3.05	0.4989	0 9989	0.0011

Appendix: Probabilities associated with the standard normal distribution (z) continued

z	Mean to z	Larger portion	Smaller portion	z	Mean to z	Larger portion	Smaller portion
3.06	0 4989	0 9989	0.0011	3 19	0.4993	0 9993	0 0007
3 07	0.4989	0 9989	0.0011	3 20	0 4993	0.9993	0 0007
3.08	0 4990	0 9990	0.0010	3 21	0 4993	0.9993	0.0007
3 09	0 4990	0.9990	0.0010	3.22	0 4994	0.9994	0.0006
3 10	0.4990	0 9990	0 0010	3 23	0.4994	0 9994	0.0006
3 11	0 4991	0 9991	0.0009	3.24	0 4994	0.9994	0.0006
3 12	0 4991	0.9991	0.0009	3.25	0 4994	0 9994	0 0006
3 13	0 4991	0.9991	0 0009	.	..	.	.
3 14	0.4992	0 9992	0.0008	3.50	0 4998	0 9998	0.0002
3 15	0.4992	0 9992	0 0008	..			...
3.16	0.4992	0 9992	0 0008	3.75	0 4999	0.9999	0 0001
3.17	0 4992	0.9992	0.0008	..		...	..
3.18	0 4993	0.9993	0 0007	4.00	0.5000	1.000	0.0000

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4 DATE OF EXAMINATION / DATUM VAN EKSAMEN

5 EXAMINATION CENTRE (E.G. PRETORIA) / EKSAMENSENTRUM (BV. PRETORIA)

6 STUDENT NUMBER / STUDENTENOMMER

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6 KONTROLEER DAT DIE UNIEKE NOMMER REG INGEVUL IS
7 MAAK SEKER DAT NET EEN ALTERNATIEF PER VRAAG GEMERK IS
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10

1	c1 c2 c3 c4 c5	36	c1 c2 c3 c4 c5	71	c1 c2 c3 c4 c5	106	c1 c2 c3 c4 c5
2	c1 c2 c3 c4 c5	37	c1 c2 c3 c4 c5	72	c1 c2 c3 c4 c5	107	c1 c2 c3 c4 c5
3	c1 c2 c3 c4 c5	38	c1 c2 c3 c4 c5	73	c1 c2 c3 c4 c5	108	c1 c2 c3 c4 c5
4	c1 c2 c3 c4 c5	39	c1 c2 c3 c4 c5	74	c1 c2 c3 c4 c5	109	c1 c2 c3 c4 c5
5	c1 c2 c3 c4 c5	40	c1 c2 c3 c4 c5	75	c1 c2 c3 c4 c5	110	c1 c2 c3 c4 c5
6	c1 c2 c3 c4 c5	41	c1 c2 c3 c4 c5	76	c1 c2 c3 c4 c5	111	c1 c2 c3 c4 c5
7	c1 c2 c3 c4 c5	42	c1 c2 c3 c4 c5	77	c1 c2 c3 c4 c5	112	c1 c2 c3 c4 c5
8	c1 c2 c3 c4 c5	43	c1 c2 c3 c4 c5	78	c1 c2 c3 c4 c5	113	c1 c2 c3 c4 c5
9	c1 c2 c3 c4 c5	44	c1 c2 c3 c4 c5	79	c1 c2 c3 c4 c5	114	c1 c2 c3 c4 c5
10	c1 c2 c3 c4 c5	45	c1 c2 c3 c4 c5	80	c1 c2 c3 c4 c5	115	c1 c2 c3 c4 c5
11	c1 c2 c3 c4 c5	46	c1 c2 c3 c4 c5	81	c1 c2 c3 c4 c5	116	c1 c2 c3 c4 c5
12	c1 c2 c3 c4 c5	47	c1 c2 c3 c4 c5	82	c1 c2 c3 c4 c5	117	c1 c2 c3 c4 c5
13	c1 c2 c3 c4 c5	48	c1 c2 c3 c4 c5	83	c1 c2 c3 c4 c5	118	c1 c2 c3 c4 c5
14	c1 c2 c3 c4 c5	49	c1 c2 c3 c4 c5	84	c1 c2 c3 c4 c5	119	c1 c2 c3 c4 c5
15	c1 c2 c3 c4 c5	50	c1 c2 c3 c4 c5	85	c1 c2 c3 c4 c5	120	c1 c2 c3 c4 c5
16	c1 c2 c3 c4 c5	51	c1 c2 c3 c4 c5	86	c1 c2 c3 c4 c5	121	c1 c2 c3 c4 c5
17	c1 c2 c3 c4 c5	52	c1 c2 c3 c4 c5	87	c1 c2 c3 c4 c5	122	c1 c2 c3 c4 c5
18	c1 c2 c3 c4 c5	53	c1 c2 c3 c4 c5	88	c1 c2 c3 c4 c5	123	c1 c2 c3 c4 c5
19	c1 c2 c3 c4 c5	54	c1 c2 c3 c4 c5	89	c1 c2 c3 c4 c5	124	c1 c2 c3 c4 c5
20	c1 c2 c3 c4 c5	55	c1 c2 c3 c4 c5	90	c1 c2 c3 c4 c5	125	c1 c2 c3 c4 c5
21	c1 c2 c3 c4 c5	56	c1 c2 c3 c4 c5	91	c1 c2 c3 c4 c5	126	c1 c2 c3 c4 c5
22	c1 c2 c3 c4 c5	57	c1 c2 c3 c4 c5	92	c1 c2 c3 c4 c5	127	c1 c2 c3 c4 c5
23	c1 c2 c3 c4 c5	58	c1 c2 c3 c4 c5	93	c1 c2 c3 c4 c5	128	c1 c2 c3 c4 c5
24	c1 c2 c3 c4 c5	59	c1 c2 c3 c4 c5	94	c1 c2 c3 c4 c5	129	c1 c2 c3 c4 c5
25	c1 c2 c3 c4 c5	60	c1 c2 c3 c4 c5	95	c1 c2 c3 c4 c5	130	c1 c2 c3 c4 c5
26	c1 c2 c3 c4 c5	61	c1 c2 c3 c4 c5	96	c1 c2 c3 c4 c5	131	c1 c2 c3 c4 c5
27	c1 c2 c3 c4 c5	62	c1 c2 c3 c4 c5	97	c1 c2 c3 c4 c5	132	c1 c2 c3 c4 c5
28	c1 c2 c3 c4 c5	63	c1 c2 c3 c4 c5	98	c1 c2 c3 c4 c5	133	c1 c2 c3 c4 c5
29	c1 c2 c3 c4 c5	64	c1 c2 c3 c4 c5	99	c1 c2 c3 c4 c5	134	c1 c2 c3 c4 c5
30	c1 c2 c3 c4 c5	65	c1 c2 c3 c4 c5	100	c1 c2 c3 c4 c5	135	c1 c2 c3 c4 c5
31	c1 c2 c3 c4 c5	66	c1 c2 c3 c4 c5	101	c1 c2 c3 c4 c5	136	c1 c2 c3 c4 c5
32	c1 c2 c3 c4 c5	67	c1 c2 c3 c4 c5	102	c1 c2 c3 c4 c5	137	c1 c2 c3 c4 c5
33	c1 c2 c3 c4 c5	68	c1 c2 c3 c4 c5	103	c1 c2 c3 c4 c5	138	c1 c2 c3 c4 c5
34	c1 c2 c3 c4 c5	69	c1 c2 c3 c4 c5	104	c1 c2 c3 c4 c5	139	c1 c2 c3 c4 c5
35	c1 c2 c3 c4 c5	70	c1 c2 c3 c4 c5	105	c1 c2 c3 c4 c5	140	c1 c2 c3 c4 c5