Tutorial Letter/Studiebrief 201/1/2014

Organisational Research Methodology
Organisasie Navorsingsmetodologie

IOP2601

Department of Industrial and Organisational Psychology

Departement Bedryf-en Organisasiesielkunde

IMPORTANT INFORMATION/BELANGRIK INLIGTING

This tutorial letter contains important information about your module.

Hierdie studiebrief bevat belangrike inligting oor module.

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CONTENTS / *INHOUD*

Dear Student

In this Tutorial Letter you will receive feedback on Assignments 01 and 02. Model answers are given for the calculations. Please pay special attention to the mark allocation. For the multiple-choice questions, the correct alternative, as well as a discussion on it is given. Your task is to compare your completed assignments with the memoranda to see where you made mistakes. Remember that the feedback for Assignment 03 is in the study guide.

Lastly, we have also included more information on the examination. A copy of the Oct/Nov 2013 examination paper is also included in the Appendix as an example. By working through it, you will get a good idea of what could be expected of you in the examination.

Beste Student

In hierdie Studiebrief kry jy terugvoering op Werkopdragte 01 en 02. Modelantwoorde word vir die berekeninge gegee. Let asseblief op na die puntetoekenning. Die korrekte alternatief vir die meerkeusevrae asook 'n bespreking daarvan word gegee. Jou taak is om jou voltooide werkopdragte met die memoranda te vergelyk om te sien waar jy gefouteer het. Onthou dat die terugvoering vir Werkopdrag 03 in die studiegids is.

Ten slotte word daar meer inligting oor die eksamen aangebied. 'n Afskrif van die Okt/Nov 2013 vraestel word in die Aanhangsel verskaf as 'n voorbeeld. Deur daardeur te werk, sal jy 'n goeie idee kry van wat van jou in die eksamen verwag kan word.

1. FEEDBACK ON ASSIGNMENT 01 / *TERUGVOERING OOR WERKOPDRAG 01*

This is the first compulsory assignment that you had to submit and it contributes 10% towards your final mark. See page 10 in Tutorial Letter IOP2601/101/3/2014 for details on how to calculate your final mark.

A full memorandum is provided here. Compare your answers with the following memorandum and make sure that you understand this first part of the Descriptive Statistics before you continue with the next assignment on the rest of the Descriptive Statistics and the Inferential Statistics.

Hierdie werkopdrag is die eerste verpligte werkopdrag wat jy moes indien en wat 10% van jou finale jaarpunt tel. Kyk weer na bladsy 11 in Studiebrief IOP2601/101/3/2014 vir die berekening van die finale jaarpunt.

'n Volledige memorandum word hier verskaf. Vergelyk jou antwoorde met die memorandum en maak seker dat jy hierdie eerste deel van die Beskrywende Statistiek verstaan, voordat jy aangaan met die volgende werkopdrag wat handel oor die res van die Beskrywende Statistiek en die Inferensiële Statistiek.

QUESTION /*VRAAG 1-30* [30]

The correct alternatives are given in **the second column** next to the number of each question.
*Die korrekte alternatief word in **die tweede kolom** langs die nommer van elke vraag verskaf.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
1	**2**	See the purpose of the module on page 3 of the tutorial letter IOP2601/101/3/2014. Calculating and interpreting data is what analysis is about. The Research Process is discussed on page 5 of the study guide and as illustrated by Figure 3 on pages 6 of your study guide, indicates data analysis as the focus of IOP2601. *Sien die doelwit van die module op bladsy 3 van die studiebrief IOP2601/101/3/2014. Die berekening en interpretering van die data is waaroor data analise gaan. Die navorsingsproses word bespreek op bladsy 5 van die studiegids en soos geillustreer deur Figuur 3 op bladsy 6 van die studiegids, word aangedui dat data analise die fokus is van IOP2601.*
2	**1**	In the same section noted in Question 1[the research process – page 5 of the study guide], the first step of the research process is the identification of the problem. *In dieselfde afdeling waarna Vraag 1 verwys [die navorsingsproses - bladsy 5 van die studiegids], is die eerste stap van die navorsingsproses die identifisering van die probleem.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
3	**3**	Determining whether there is a relationship between variables is part of summarising and describing data. See page 16 of the study guide. *Bepaling of daar 'n verband is tussen veranderlikes is deel van die opsomming en beskrywing van data. Sien bladsy16 van die studiegids.*
4	**1**	All students registered for the IOP2601 module (547 students) represent the population of the study and the sample is the 100 students selected from the list. See the definition of a population on page 14 of Tredoux and Durrheim (2002, 2013) and pages 21 to 22 of the study guide. *Alle student wat geregistreer is vir die IOP2601 module (547 studente) verteenwoordig die populasie van die studie en die steekproef is die 100 studente wat geselekteer is vanaf die lys. Dien die definisie van 'n populasie op bladsy 14 van Tredoux en Durrheim (2002, 2013) en bladsye 21 tot 22 van die studiegids.*
5	**3**	The statistic used to determine the relationship between variables is the correlation. See page 66 of the study guide. *Die statistiek wat gebruik word om die verband tussen veranderlikes te bepaal is korrelasie. Sien bladsy 67 van die studiegids.*
6	**1**	In terms of measurement, levels of performance have the property of magnitude – thus the ordinal scale is the correct scale. Measurement scales are discussed on page 11 – 12 of Tredoux & Durrheim (2002, 2013) and pages 19 to 21 of the study guide have the activities on the measurement scales. *In terme van die meting van vlakke van prestasie, besit die meting die eienskap van grootte, dus is die ordinale skaal die korrekte skaal. Metingskale word bespreek op bladsy 11 - 12 van Tredoux & Durrheim (2002, 2013) en bladsye 19 tot 21 van die studiegids het aktiwiteite rakende die metingskale.*
7	**4**	The Real Lower Limit (RLL) can be found halfway between 9 [from the neighboring class interval of 7-9] and 10 [from the class interval of interest of 10-12]. The RLL for the class interval 10-12 is 9,5. See page 24 of Tredoux & Durrheim (2002, 2013) and page 38 of the study guide for discussion. The activities are on page 40 of the study guide. *Die Werklike Onderstegrens (WOG) kan gevind word halfpad tussen 9 [van die naburige klasinterval van 7-9] en 10 van die klasinterval van belang van naamlik 10-12]. Die WOG vir die klasinterval 10-12 is 9,5. Sien bladsy 24 van Tredoux & Durrheim (2002, 2013) en bladsy 38 van die studiegids vir bespreking. Die aktiwiteite is op bladsy 40 van die studiegids.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
8	1	Similar to the above, real upper limits are discussed in the same section. The Real Upper Limit (RUL) for class interval 7-9 is 9,5. *Soortgelyk aan die bogenoemde word die werklike boonste grens (WBG) bespreek in dieselfde afdeling. Die werklike boonste grens vir die klasinterval 7-9 is 9,5.*
9		Please note: there was an error on question 9 – the question appears differently for English and Afrikaans, resulting in different answers. The question was credited accordingly so that no students were disadvantaged. *Let wel: daar was 'n fout begaan op die vraag 9 - Die vraag verskyn verskillend vir die Afrikaans en Engelse weergawes, wat verskillende antwoorde toon. Die vraag is dus aan studente gekrediteer, sodat geen studente benadeel word in die proses nie.*
10	4	See page 69 and 70 of the study guide for a complete summation table. The $\sum Y^2$ means adding up all the values under the column Y^2. Remember, there is a difference between $\sum Y^2$ and $(\sum Y)^2$. Always double check your calculations for the summation table because the answers you get are the ones that you end up using in all your substitutions for formulas – which means if there is an error in one score, it will impact in all the subsequent calculations in which you use that score. *Sien bladsy 70 en 71 van die studiegids vir die volledige sommasie tafel. Die $\sum Y^2$ beteken die optel van al die waardes onder die kolom Y^2. Onthou, daar is 'n verskil tussen $\sum Y^2$ en $(\sum Y)^2$. Jy moet altyd dubbel seker maak van jou berekeninge vir die sommasie tafel, want die antwoorde wat jy kry gebruik jy weer vir al die substitusies wat jy maak in die opeenvolgende berekenings. Dit wil sê dat as daar 'n fout in een telling is, sal dit 'n impak hê op al die daaropvolgende berekeninge waar jy gebruik maak van die telling.*
11	2	$(\sum Y)^2$ is the sum total of all the scores under the column Y, then square the total. So for this case, $\sum Y = 58$; and the square of that is (58 x 58) = 3364. *$(\sum Y)^2$ is die somtotaal van al die tellings onder kolom Y. Hierna maal die getal (die antwoord) met homself. So in hierdie geval, $\sum Y = 58$, en die vierkant is dus (58 x 58) = 3364.*
12	1	Using the scores of each student, multiply X by Y, and then add up all the scores. Therefore $\sum XY = 228$. Remember, there is a difference between $\sum XY$ and $(\sum X)(\sum Y)$. *Deur gebruik te maak van die tellings van elke student, vermenigvuldig X met Y en voeg dan al die tellings by mekaar. Daarom $\sum XY = 228$. Onthou, daar is 'n verskil tussen $\sum XY$ en $(\sum X)(\sum Y)$.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
13	**2**	The mode is the most occurring score in a distribution. For X, the score that is most occurring from 1 2 **3 3 3** 4 4 5 6 7 is 3. See study unit 5, pages 53 to 54 of the study guide for definition and activities. *Die modus is die getal wat die meeste voorkom in 'n datastel. Vir X, is die telling wat die meeste voorkom vanaf 1 2 **3 3 3** 4 4 5 6 7 = 3. Sien studie eenheid 5, bladsye 53 tot 54 van die studiegids vir die definisie en aktiwiteite.*
14	**1**	To ensure you have the correct median, you need to calculate the median location. Before calculating the median location, it is always better to rank the scores in ascending order: 1 2 3 3 3 4 4 5 6 7 Median location: $(N+1) / 2 = (10 + 1) / 2 = 11 / 2 = 5,5^{th}$ position; therefore the median will be in the middle of 3 and 4 which is equal to 3,5. The median is discussed on pages 45 to 46 of the prescribed book and you can do the activities on page 52 of the study guide. *Om te verseker dat jy die korrekte mediaan het, moet jy die mediaan se plek in die datastel bereken. Voor die berekening van die mediaan posisie, is dit altyd beter om die tellings in 'n stygende volgorde te rangskik: 1 2 3 3 3 4 4 5 6 7* *Mediaan posisie: (N +1) / 2 = (10 + 1) / 2 = 11 / 2 = 5,5de posisie, dus sal die mediaan in die middel van 3 en 4 wees. Dit wil sê dit is gelyk aan 3,5.* *Die mediaan word bespreek op bladsye 45 tot 46 van die voorgeskrewe boek en jy kan die aktiwiteite op bladsy 52 van die studiegids doen.*
15	**1**	The mean of Y: / *Die gemiddelde van Y:* $\overline{X} = \sum Y / N = 58 / 10 = 5,8.$ See page 41 of the prescribed book for explanation and the exercises are on page 50 of the study guide. *Sien bladsy 41 van die voorgeskrewe boek vir 'n verduideliking en die oefeninge op bladsy 51 van die studiegids.*
16	**2**	The discussion of the standard deviation is on page 60 to 61 of the prescribed book. The Equation 4.7 on page 62 of the prescribed book is relevant for the calculations of the standard deviation. For practice, the activities are on page 61 to 62 of the study guide. *Die bespreking van die standaardafwyking is op bladsy 60 tot 61 van die voorgeskrewe boek. Die vergelyking 4.7 op bladsy 62 van die voorgeskrewe boek is relevant vir die berekening van die standaardafwyking. Vir oefening, die aktiwiteite is op bladsy 61 tot 62 van die studiegids.*

Item	Answer / Antwoord	Comments / Kommentaar
17	1	The range is the difference between the highest score [8] and the lowest score [3], therefore, 8 – 3 = 5. The range is discussed on page 54 of Tredoux and Durrheim (2002, 2013) and page 59 of the study guide. The activities are on pages 59 to 60 of the study guide. *Die omvang is die verskil tussen die hoogste telling [8] en die laagste telling [3], dus 8 - 3 = 5. Die omvang word op bladsy 54 van Tredoux en Durrheim (2002, 2013) en bladsy 59 van die studiegids bespreek. Die aktiwiteite is op bladsye 60 tot 61 van die studiegids.*
18	4	The intercept is depicted by the symbol *a*, *Die afsnit word voorgestel deur die "a" simbool* $a = \bar{Y} - b\bar{X}$ $= 5{,}8 - (0{,}25)(3{,}8)$ $= 5{,}8 - 0{,}95$ $= \mathbf{4{,}85}$ The regression equation and all its elements are discussed from page 82 to 85 of the study guide. *Die regressie-vergelyking en al sy elemente word bespreek vanaf bladsy 83 tot 85 van die studiegids.*
19		Please note: there was an error on question 19 – the question appears differently for English and Afrikaans, resulting in different answers. The question was credited accordingly so that no students were disadvantaged. *Let wel: daar was 'n fout begaan op die vraag 19 - Die vraag verskyn verskillend vir die Afrikaans en Engelse weergawes, wat verskillende antwoorde toon. Die vraag is dus aan studente gekrediteer, sodat geen studente benadeel word in die proses nie.*
20	3	The common variance is calculated by squaring the correlation coefficient. Therefore the value of the common variance cannot be a negative value. See page 74 of the study guide for an explanation of the common variance. *Die gemeenskaplike variansie word bereken deur die korrelasiekoëffisiënt te kwadreer. Daarom kan die waarde van gemeenskaplike variansie nie 'n negatiewe waarde wees nie. Sien bladsy 75 tot 76 van die studiegids vir 'n beskrywing van gemeenskaplike variansie.*
21	4	On page 27 of the prescribed book, Equation 2.1 is provided as the formula for calculating the midpoint. Therefore, the midpoint of the class interval 69-74 is: 68,5 + (74,5 - 68,5 / 2) = 68,5 + (3) = 71,5. The study guide, page 40, has exercises on the midpoint. *Vergelyking 2.1 op bladsy 27 van die voorgeskrewe boek, word gebied as die formule vir die berekening van die middelpunt. Daarom is die middelpunt van die klasinterval 69-74: 68,5 + (74,5 - 68,5 / 2) = 68,5 + (3) = 71,5. Die studiegids, bladsy 40, het oefeninge om die middelpunt uit te werk.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
22	**3**	Study unit 4, pages 44 - 48 of study guide *Studie eenheid 4, bladsye 44 tot 49 van die studiegids* Percentile / *persentiel* rank = % below + $\dfrac{\text{score} - \text{RLL}}{\text{class int width / Klasinterval breedte}}$ (interval %) $= 64 + \dfrac{66 - 62,5}{6}(14)$ $= 64 + \dfrac{3,5}{6}(14)$ $= 64 + 8,166$ $= \mathbf{72,17}$
23	**1**	Study unit 4, pages 44 - 48 of study guide *Studie eenheid 4, bladsye 44 tot 49 van die studiegids* Score of p $= \text{RLL / WOG} + \dfrac{\text{PR - \% below}}{\text{Interval\%}}$ (interval width/ *interval breedte*) $= 56,5 + (55-37/27)(6)$ $= 56,5 + 3,99$ $= \mathbf{60,49}$
24	**4**	Only the relationship between anxiety and RSE displays a p-value of smaller than 0.01. The other two relationships do not display a p-value of less than 0.01 and are therefore not significant. *Slegs die verband tussen angstigheid en NSE toon 'n p-waarde van minder as 0.01. Die ander twee verbande toon nie 'n p-waarde van minder as 0.01 nie en is daarom nie betekenisvol nie.*
25	**1**	The Y intercept is discussed on page 82 of the study guide and pages 163 to 164 of the prescribed book. *Die Y-afsnit word bespreek op bladsy 85 van die studiegids en bladsye 163 tot 164 van die voorgeskrewe boek.*
26	**2**	See section 8.3 on page 11 of the tutorial letter IOP2601/101/3/2014 for a discussion on submitting assignments. *Sien afdeling 8.3 op bladsy 11 van die studiebrief IOP2601/101/3/2014 vir 'n bespreking oor die indiening van werkopdragte.*

Item	Answer / *Antwoord*	Comments / *Kommentaar*
27	**2**	The year mark calculations are presented on page 10 of the tutorial letter IOP2601/101/3/2014.
		Die jaarpunt berekening word op bladsy 10 van die studiebrief IOP2601/101/3/2014 aangedui.
28	**2**	The assessment plan for Assignment 02 is on page 8 of the tutorial letter IOP2601/101/3/2014.
		Die assesseringsplan vir Werkopdrag 02 is op bladsy 8 van studiebrief IOP2601/101/3/2014.
29	**1**	On page 11 of the tutorial letter IOP2601/101/3/2013; the subminimum is set at 40%.
		Op bladsy 11 van die studiebrief IOP2601/101/3/2013 is die subminimum vasgestel op 40%.
30	**2**	See section 8.3 on page 11 of the tutorial letter IOP2601/101/3/2014 for a discussion on submitting assignments.
		Sien afdeling 8.3 op bladsy 11 van die studiebrief IOP2601/101/3/2014 vir 'n bespreking oor die indiening van werkopdragte.

TOTAL: [30]
TOTAAL: [30]

2. FEEDBACK ON ASSIGNMENT 02 / *TERUGVOERING OOR WERKOPDRAG 02*

This is the second compulsory assignment that you had to submit and it contributes 10% towards your final mark. See page 10 in Tutorial Letter IOP2601/101/3/2014 for details on how to calculate your final mark.

Hierdie werkopdrag is die tweede verpligte werkopdrag wat jy moes indien en wat 10% van jou finale jaarpunt tel. Kyk weer na bladsy 10 in Studiebrief IOP2601/101/3/2014 vir die berekening van die finale jaarpunt.

A full memorandum is provided here. Compare your answers with the following memorandum and make sure that you understand the rest of the Descriptive Statistics and the Inferential Statistics that are covered in this assignment.

'n Volledige memorandum word hier verskaf. Vergelyk jou antwoorde met die memorandum en maak seker dat jy die res van die Beskrywende Statistiek en die Inferensiële Statistiek verstaan wat in hierdie werkopdrag gedek word.

REMEMBER:
● Always give the formula (computational formula) for the computation asked - in most cases you will receive a mark for it.
● Read the questions carefully.
● Do computations with the variable asked. You will not receive any marks if you do the computations correctly but with the wrong variable.

ONTHOU:
● *Gee altyd die formule (berekeningsformule) vir die berekening wat gevra word — meesal word 'n punt daarvoor toegeken*
● *Lees die vrae deeglik deur.*
● *Doen berekenings met die veranderlike wat gevra word. Geen punte word toegeken indien jydie berekenings korrek doen met die verkeerde veranderlike nie.*

QUESTION 1/ *VRAAG 1* **[8]**

1.1 p(Zuko) = 35/450
= 0,0777
= 0,08 (2)

1.2 p(Buyile) = 12/449
= 0,0267
= 0,03 (2)

1.3 p(Zuko) x p(Buyile) = (35/450) x (12/449)
= 0,08 x 0,03
= 0,0024

p(Buyile) x p(Zuko) = (12/450) x (35/449)
= 0,03 x 0,08
= 0,0067

p(Zuko & Buyile*)* = 0,0024 + 0,0067
= 0,0091
= 0,01 (4)

QUESTION/*VRAAG* 2 **[6]**

You collected information from your fellow students on how valuable they found the module of IOP2601 by asking them for a rating on a 5 point scale on 5 different questions. Given a normally distributed population with a mean (μ) of 15, a standard deviation (σ) of 3, and 30 as the number of cases (N), answer the following questions:

Jy het inligting ingesamel oor hoe waardevol jou medestudente die module van IOP2601 gevind het. Hulle moes vyf vrae volgens 'n vyfpuntskaal beantwoord. Jy werk met 'n normaal verspreide populasie met 'n gemiddeld (μ) van 15, 'n standaardafwyking (σ) van 3 en 'n aantal gevalle (N) van 30. Beantwoord die volgende vrae:

2.1   What is the **proportion** of students with a raw score less than 10? / *Wat is die **proporsie** van studente met 'n routelling kleiner as 10?* (2)

$$z = \frac{X - \mu}{\sigma}$$

$$= \frac{10 - 15}{3}$$

$$= \frac{-5}{3}$$

$$= -1,67$$
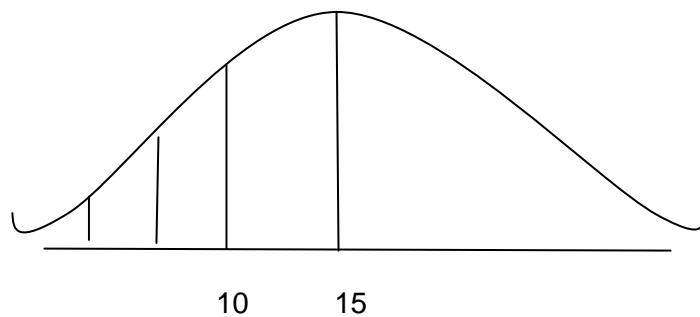
Proportion/*Proporsie* = **0,04746**

2.2   What is the **percentage** of students with a raw score greater than 21? / *Wat is die **persentasie** van studente met 'n routelling groter as 21?* (2)

$$z = \frac{X - \mu}{\sigma}$$

$$= \frac{21 - 15}{3}$$

$$= \frac{6}{3}$$

$$= 2,00$$
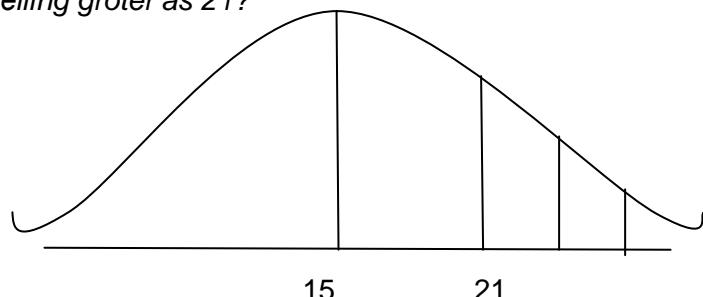
Proportion/*Proporsie* = **0,02275**

Percentage/*Persentasie* = **2, 27% of 2, 28%**

2.3   What is the **number** of students with a raw score between 10 and 21? / *Wat is die **aantal** studente met routellings tussen 10 en 21?* (2)

X = 10: Mean to Z (1,67) score = 0,45254

X = 21: Mean to Z (2,00) score = 0,47725

    Total   = **0.92979**

0,92979 x 30 students/*studente* = 27,89

                    = **28 students/*studente***
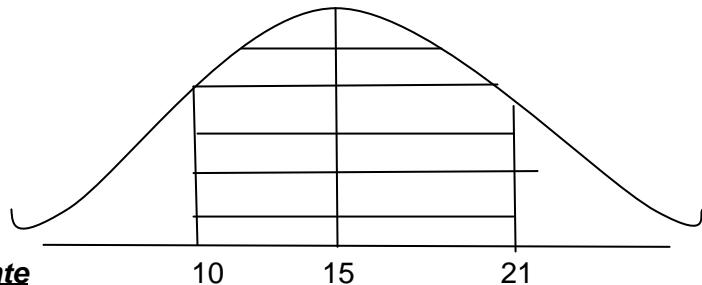
QUESTION/*VRAAG* 3   **[4]**

3.1   Null hypothesis: There is no difference in employees' who are engaged in a coaching program's intention to stay with the organsiation compared those employees that are not engaged with a coaching program.
OR
Employees who are engaged in a coaching program and employees that are not engaged in a coaching program are similar in terms of their intention to stay with the organisation

       Alternative hypothesis: Employees who are engaged in a coaching program is more inclined to stay with the organization than those employees that are not engaged in a coaching program.

       Nulhipotese: *Daar is geen verskil in werknemers wat betrokke is in 'n persoonlike afrigtingsprogram se voorneme om by die organisasie te bly in vergelyking met die werknemers se voorneme wat nie betrokke is in 'n persoonlike afrigtingsprogram nie.*
OF
Werknemers wat betrokke is in 'n persoonlike afrigtingsprogram en werknemers wat nie betrokke is in 'n afrigtingsprogram nie, is ewe geneig om by die organisasie te bly

       Alternatiewe hipotese: *Werknemers wat betrokke is in 'n persoonlike afrigtingsprogram is meer geneig om by die organisasie te bly as dié werknemers wat nie betrokke is in 'n persoonlike afrigtingsprogram nie.*

                                            (2)

3.2 $H_0 = \mu_{engaged\ in\ /\ betrokke\ in} = \mu_{not\ engaged\ with\ /\ onbetrokke\ in}$

    OR/*OF*

    $H_0 = \mu_{engaged\ in\ /\ betrokke\ in} - \mu_{not\ engaged\ with\ /\ onbetrokke\ in} = 0$

    $H_1 = \mu_{engaged\ in\ /\ betrokke\ in} > \mu_{not\ engaged\ with\ /\ onbetrokke\ in}$ (2)

3.3   Yes, reject the null hypothesis. *Ja, verwerp die nulhipotese.*   (1)

3.4   There is a significant difference between employees that are engaged in a coaching program and employees who did not engage in the coaching program's intention to stay with the organization. This can be said with 99% certainty. *Daar is 'n betekenisvolle verskil tussen werknemers wat deel was van' n persoonlike afrigtingsprogram en die werknemers wat nie deel was van 'n persoonlike afringtingsprogram se voorneme om by die organisasie te bly. Dit kan met 99% sekerheid gesê word.*

QUESTION/*VRAAG* 4 **[10]**

Data

Group A	Group B	D	D²
9	6	3	9
8	6	2	4
7	6	1	1
9	5	4	16
6	5	1	1
8	5	3	9
8	4	4	16
5	3	2	4
9	3	6	36
7	4	3	9
$\sum X = 76$	$\sum Y = 47$	29	105
		$\overline{D} = 2,9$ $S_D = 1,89$	

$$s_D^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1} \qquad\qquad s_D = \sqrt{s_D^2}$$

$$= \frac{105 - \frac{(27)^2}{10}}{10-1} \qquad\qquad = 1,889$$

$$\qquad\qquad\qquad = 1,89$$

$$= \frac{32,10}{9}$$

$$= 3,57$$

4.1 H_0: $\mu_{experimental}$ = $\mu_{control}$ (1)

4.2 H_1: $\mu_{experimental}$ ≠ $\mu_{control}$ (1)

4.3

$$t = \frac{\overline{D} - 0}{\frac{s_D}{\sqrt{N}}}$$ (1)

$$= \frac{2,9 - 0}{\frac{1,89}{\sqrt{10}}}$$ (1)

$$= \frac{2,9}{\frac{1,89}{3,162}}$$

$$= \frac{2,9}{0,598}$$

$$= 4,849 \tag{1}$$

4.4 $df = N - 1$

$$= 10 - 1$$
$$= 9 \tag{1}$$

4.5 $t_{0.01}(9) = 3,2498$ (1)

4.6 $4,849 > 3,2498$
    $\therefore$ *Reject/Verwerp* H_0 (1)

4.7   It can be concluded with 99 % certainty that there is a difference between the experimental and control groups' level of happiness.

    Dit kan met 99% sekerheid gesê word dat daar 'n verskil is in die vlak van geluk tussen die eksperimentele en kontrole groep.   .   (2)

QUESTION/*VRAAG* 5   **[12]**

Data

X_1	X_2	X_3	X^2_1	X^2_2	X^2_3
6	4	4	36	16	16
6	2	3	36	4	9
5	3	5	25	9	25
7	5	3	49	25	9
8	1	5	64	1	25
$\Sigma X_1 = 32$	$\Sigma X_2 = 15$	$\Sigma X_3 = 20$	$\Sigma X^2_1 = 210$	$\Sigma X^2_2 = 55$	$\Sigma X^2_3 = 84$
$\overline{X} = 6,4$	$\overline{X} = 3,0$	$\overline{X} = 4,0$			
Total $\Sigma X = 32 + 15 + 20 = 67$ $\Sigma X^2 = 210 + 55\ 84 = 349$ $\overline{X} = 4,47$					

$$SS_{total} = \Sigma X^2 - \frac{(\Sigma X)^2}{N} \qquad\qquad df = N - 1$$

$$= 349 - \frac{(67)^2}{15} \qquad\qquad\qquad\quad = 15 - 1$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad = 14$$

$$= 349 - \frac{4489}{15}$$

$$= 349 - 299,26$$

$$= 49,74$$

SS_{group} = $n\Sigma(X_j - X..)^2$ df = k - 1

      = $5[(3,0 - 4,47)^2 + (4,0 - 4,47)^2 + (6,4 - 4,47)^2]$ = 3 - 1

      = $5[(-1,47)^2 + (-0,47)^2 + (1,93)^2]$ = 2

      = 5 [(2,16) + (0,22) + (3,72)]

      = 5 [6,1]

      = 30,5

SS_{error} = SS_{total} - SS_{group} df = $k(n - 1)$

      = 49,74 – 30,5   = 3 (5 - 1)

      = 19,24   = 12

MS_{group} = SS_{group} / df_{group}

      = 30,5 / 2

      = 15,25

MS_{error} = SS_{error} / df_{error}

      = 19,24 / 12

      = 1,60

$$F = \frac{MS_{group}}{MS_{error}}$$

$$= \frac{15,25}{1,60}$$

$$= 9,53$$

5.1

Source/*Bron*	*df*	*SS*	*MS*	*F*
Groups/*Groepe*	2	30,50	15,25	9,53
Error/*Fout*	12	19,24	1,60	
Total/*Totaal*	14	49,74		

(8)

5.2 $F_{0,05}(2,12) = 6,93$

(1)

5.3   9,53 > 6,93

     ∴ Reject the null hypothesis / V*erwerp die nulhipotese.*   (1)

5.4 There **is a significant difference in work engagement levels** of the three different generation groups. This can be said **with 99% certainty**.

Daar is 'n beduidende verskil in die werksbegeesteringsvlakke van die drie verskillende generasie groepe. Dit kan gesê word met 99% sekerheid. (2)

QUESTION/*VRAAG* 6 [3]

6.1 No, do not reject the null hypothesis. *Nee, moet nie die nulhipotese verwerp nie.* (1)
6.2 There is no significant difference between the psychological safety scores of the three age groups. This can be said with 99% certainty.

Daar is geen betekenisvolle verskil tussen die psigologiese veiligheidstellings van die drie ouderdomsgroepe nie. Dit kan gesê word met 99% sekerheid. (2)

QUESTION/*VRAAG* 7 [4]

Data

	A	**B**	**Total**
Students / *Studente*	12 (23,14)	33 (21,86)	**45**
Registered Psychologists / *Geregistreerde sielkundiges*	42 (30,86)	18 (29,14)	**60**
Total / *Totaal*	**54**	**51**	**105**

$$E_{ij} = \frac{R_i \, C_j}{N}$$

$$E_{11} = \frac{45 \times 54}{105} = 23,14$$

$$E_{12} = \frac{45 \times 51}{105} = 21,86$$

$$E_{21} = \frac{60 \times 54}{105} = 30,86$$

$$E_{22} = \frac{60 \times 51}{105} = 29,14$$

$$\chi2 = \Sigma \frac{(O - E)^2}{E}$$

$$= (12 - 23,14)^2/23,14 + (33 - 21,86)^2/21,86 + (42 - 30,86)^2/30,86 + (18 - 29,14)^2/29,14$$

$$= (124,10)/23,14 + (124,10)/21,86 + (124.10)/30,86 + (124.10)/29,14$$

$$= (5,36) + (5,68) + (4,02) + (4,26)$$

$$= 19,32$$

7.1 df = $(R-1)(C-1)$

          = $(2-1)(2-1)$

          = 1

$\chi^2_{0.01}(1)$ = $6{,}6349$ (1)

7.2 $19{,}32 > 6{,}6349$

$\therefore$ Reject H_0 (1)

7.3   There is **a significant difference** between registered psychologists' and students' perceptions regarding the future for young industrial psychologists in the field. This can be said with **99% certainty**.

Daar is 'n beduidende verskil tussen geregistreerde sielkundiges en studente se persepsies rakende die toekoms vir jong bedryfsielkundiges in die veld. Dit kan gesê word met 99% sekerheid.   (2)

3.   EXAMINATION INFORMATION/ *EKSAMEN INLIGTING*

Refer to point 10, page 40 in Tutorial Letter 101/3/2014 for information on the examination. For examination preparation, we suggest that you work through the study guide thoroughly, and where reference is made to sections and pages in the textbook, you can summarise those sections for yourself and integrate them with the study guide material. In this way, when you start your revision for the examination, you should be able to focus on the study guide and your own summaries.

Verwys na punt 10, bladsy 42 in Studiebrief 101/3/2014 vir inligting oor die eksamen. Vir eksamenvoorbereiding stel ons voor dat jy deeglik deur die studiegids werk en, waar daar na dele en bladsye in die voorgeskrewe boek verwys word, jy daardie gedeeltes opsom en integreer met die materiaal in die studiegids. Wanneer jy dus vir die eksamen voorberei, hoef jy slegs op die studiegids en jou eie opsommings te fokus.

We have also included a past examination paper to give you an indication of the format of the examination and the type of questions that you could expect in the examination.

Ons het ook 'n vorige vraestel ingesluit om aan jou 'n aanduiding te gee van die eksamenformaat en die tipes vrae wat jy kan verwag.

There are no multiple choice questions in the examination, but Section 1 will consist of some short questions. Some examples of calculation-type questions, taken from the Oct/Nov 2013 examination, appear in the Appendix. Remember that formulae and tables will be provided in the examination paper.

Daar is geen meervoudige keuse vrae in die eksamen nie, maar Afdeling 1 sal uit kortvrae bestaan. 'n Paar voorbeelde van berekeningstipe vrae wat uit die Okt/Nov 2013 eksamen geneem is, verskyn in die Aanhangsel. Onthou dat formules en tabelle in die eksamenvraestel verskaf sal word.

The pass mark for the examination is 50 percent. If you are admitted to the supplementary examination, you will be able to rewrite the examination next semester. If you fail the supplementary examination you will have to register for this module again.

Die slaagsyfer vir die eksamen is 50 persent. Indien jy tot die hereksamen toegelaat word, sal jy die eksamen die volgende semester kan aflê. Indien jy nie in die hereksamen slaag nie, moet jy weer vir hierdie module registreer.

All questions (both section 1 and 2) will be answered in your examination book.

Al die vrae (beide afdelings 1 en 2) sal in jou eksamenboek beantwoord moet word.

The examination will cover the entire curriculum, that is, the whole study guide, as well as the assignments. As with the assignments, the examination paper will include questions that test knowledge, insight and application.

Die eksamen sal die hele kurrikulum dek, dit wil sê die hele studiegids sowel as die werkopdragte. Net soos by die werkopdragte, sal die eksamenvraestel ook vrae insluit wat kennis, insig en toepassing toets.

4.   APPENDIX: EXAMINATION PAPER/*AANHANGSEL: EKSAMENVRAESTEL*

SECTION 1

(1)   Which is the measure of central tendency that will be most affected by one very extreme score in a distribution of scores?

Use the information on the graph below to respond to questions 2 - 4
A low rating (e.g. 1) means a very negative feeling towards the contribution to the social fund, while a high rating (e.g. 10) means a very positive feeling.
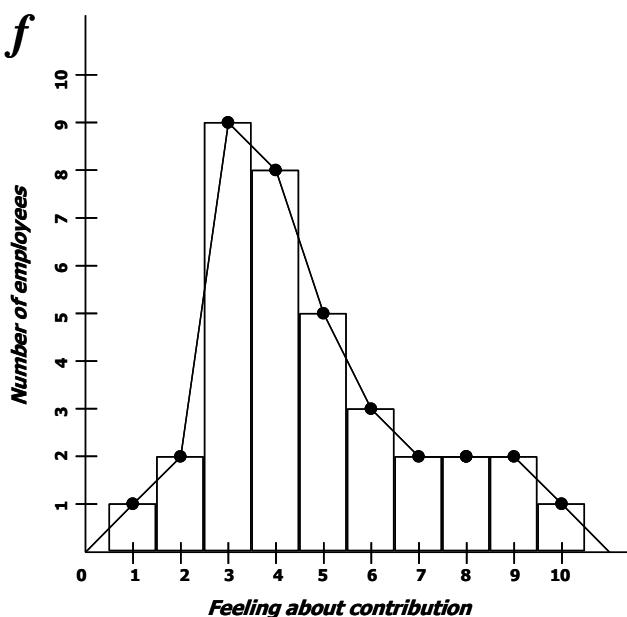
(2)   The modality of the curve is _____?

(3)   How many employees were involved in this exercise?

(4)   How many employees rated the compulsory contribution to social fund in the extremes (1 and 10) of the scale?

(5)   The median for the scores 5, 5, 6, 8, 10, 10, 17 is _____?

(6)   The standard deviation of *z* scores is always _____?

(7)   With a directional alternative hypothesis you will use a two-tailed test. Is this statement true or false?

(8)   A researcher tests a group of boys and a group of girls by means of a statistical aptitude test and comes to the conclusion that girls have a higher statistical aptitude than boys. Which is the independent variable in this research question?

(9)   Given the data:
        X: 23 16 31 29
        Y: 11 19 8 10

        $\sum(X)^2 =$

(10)   The letters P, Q, R and S were given to different course codes with no ulterior meaning other than they are labels. The type of measurement scale that will be used in this case is the _____ scale.

(11)   It is always necessary to have the total number of scores to enable the calculation of the mean. Is this statement true or false?

(12)   The following are the engagement scores for a few IOP2601 students: [10, 2, 8, 13, 13, 9, 4, 6, 13, 18]. The range is _____?

        Use the data from the table below to answer questions (13) to (16):

Class interval	Frequency	Cumulative frequency	% Frequency	Cumulative % frequency
75 - 80	5	70	7	100
69 - 74	10	?	14	93
63 - 68	14	55	?	79
57 - 62	15	41	21	?
51 - 56	13	26	19	38
45 - 50	13	13	19	19

(13)   The interval size for this distribution is _____.

(14)   The cumulative frequency for the class interval [69-74] is _____.

(15)   The percentage frequency for the class interval [63-68] is _____.

(16)   The cumulative percentage frequency for the class interval [57-62] is _____.

Two departments have entered a crossword puzzle competition to win R15 000 worth of prizes from a leading computer store. Department A sent 40 entries while Department B sent in 37. The report from the competition administrators is that 500 entries qualified and from the solution provided both departments qualified. Use this information to answer the following questions [17 – 19].

(17)   What is the probability that Department A will win the first prize?

(18)   If Department A wins first prize, what is the probability that Department B will win second prize? (The first prizewinning entry is not put back in the hopper.)

(19)   What is the probability that the two departments will win first and second prize?

(20) Lecturers were interested to know if younger and older students differ with regard to the amount of effort that they are willing to put into their statistics studies. The level of significance is 0.05. The results of an independent t-test are shown below. Use the results to answer the question that follows:

Group Statistics

Age		N	Mean	Std. Deviation	Std. Error Mean
Effort	Younger	63	6.3757	.95131	.11985
	Older	171	6.3275	.99573	.07615

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference
Effort	Equal variances assumed	1.418	.235	.332	232	.740	.04818
	Equal variances not assumed			.339	115.300	.735	.04818

Is there a statistically significant difference between younger and older students and the amount of effort which they are willing to put into their statistics studies?

TOTAL SECTION 1: [20]

SECTION 2

QUESTION 1 [18]

A large financial institution has recently opened a new call centre to handle most of their customer queries. Before the call centre was opened, the telephone operators underwent intensive training in order to improve their communication skills. As the human resource officer of this institution, you now want to know if this training has had any effect on the telephone operators' ability to handle the incoming calls. You collect the scores on the communication skills rating done at the end of the training and the number of calls handled successfully in an hour. After analysing the data, you found the following:

- The relationship between the communication skills and number of calls handled successfully was **0,59**.
- The mean of X (communication skills) was **17,7** and the mean of Y (number of calls handled successfully) was **32,4**.
- The slope was **0,85**.

Use the results above to respond to the following questions:

(a) Interpret the correlation coefficient. (2)

(b)   What deduction can be made about the nature of the relationship?   (1)

(c)   Calculate the percentage of common variance between the two sets of scores and then illustrate this percentage diagrammatically.   (2)

When you presented the results of the calculations to the human resources department, you mentioned that you could use a certain formula to predict the telephone operators' ability to handle calls successfully, based on their communication skills score.

(d)   What is the value of the intercept?   (2)

(e)   Calculate the telephone operator's ability to handle calls successfully with a communication skills score of 15.   (1)

(f)   Provide a graphic representation of the regression line by indicating the intercept and predicted value for a telephone operator with a communication skills score of 15.   (5)

The telephone operators completed a questionnaire to measure their perception of the effectiveness of the communication skills training programme. The minimum score that could be obtained was 45 (indicating that the programme was not effective at all) and the maximum score was 80 (indicating that the programme is very effective).   Use the frequency table below to do the following calculations:

Class interval	Frequency	Cumulative frequency	% Frequency	Cumulative % frequency
75 - 80	7	110	6	100
69 - 74	11	103	10	94
63 - 68	23	92	21	84
57 - 62	25	69	23	63
51 - 56	30	44	27	40
45 - 50	14	14	13	13

(g)   What is the percentage of telephone operators who fall below a high effectiveness rating? In other words, determine the percentile rank of a score of 68.   (3)

(h)   What is the score at which 55% of all the telephone operators scored? In other words, what score is found at the 55th percentile?   (2)

QUESTION 2   [6]

You collected information from your fellow students on how much they have used myUnisa in studying this module by asking them for a rating on a 5-point scale on five different questions. Given a normally distributed population with a mean (μ) of 4, a standard deviation (σ) of 2, and 10 as the number of cases (N), answer the following questions:

(a)   What is the **proportion** of students with a raw score larger than 9?   (2)

(b)   What is the **percentage** of students with a raw score larger than 3?   (2)

(c)   What is the **number** of students with raw scores between 3 and 9?   (2)

QUESTION 3   [10]

You are interested in determining whether a new profit-sharing scheme will have any effect on the job performance of employees in your organisation. To determine this, you decide to select randomly two groups of 10 employees each (Group A and Group B). Each employee in Group A is **matched** with another employee in Group B on the basis of their respective hierarchical levels in the organisation.

The profit-sharing scheme is subsequently implemented for Group A employees, but NOT for Group B employees. After six months, you measure the job performance of both Group A and Group B employees.

GROUP A	GROUP B
10	6
8	5
7	6
9	4
6	3
8	4
8	3
5	4
9	5
7	5

You would now like to determine whether there is a meaningful difference between the scores of Group A and Group B. You set the level of significance at $\alpha = 0,05$.

(a) Formulate an appropriate null hypothesis (H_0) in symbols. (1)

(b) Formulate an appropriate alternative hypothesis (H_1) in symbols. (1)

(c) Assuming that your data are normally distributed, select an appropriate statistical test and calculate the test statistic. Show ALL calculations! (3)

$\bar{D} = 3,2$	$s_D = 2,18$

(d) Determine the degrees of freedom. (1)

(e) Determine the critical value for a two-tailed test for a significance level of 5% (0,05). (1)

(f) Interpret the results in terms of the rejection or nonrejection of the null hypothesis. (1)

(g) Interpret your rejection or nonrejection of the null hypothesis in plain language, in terms of the original problem statement. With how much certainty can you conclude this? (2)

QUESTION 4 [12]

As an industrial psychologist, you are asked to do a climate study in a large organisation. As you proceed with the study, you become interested in the influence of working in different sectors of the organisation on the attitude of the employees towards the organisation. You survey a few people in three different sectors (marketing, accounting and production) concerning their attitudes toward the organisation. The scores from these surveys are given in the table below (higher scores indicate a more positive attitude).

MARKETING	ACCOUNTING	PRODUCTION
2	6	3
4	4	5
1	7	6
1	3	8
5	5	9
$\overline{X} = 2{,}6$	$\overline{X} = 5{,}0$	$\overline{X} = 6{,}2$
Total mean	$\overline{X} = 4{,}6$ $\Sigma X = 69$ $\Sigma X^2 = 397$	

In your report to management, you answer the following question: Is there a significant difference in attitude toward the organisation among employees working in different sectors of the organisation? Or stated differently, you test the following null hypothesis:

$$H_0 : \mu_{GR1} = \mu_{GR2} = \mu_{GR3} \text{ with } \alpha = 0{,}05$$

(a) Choose an appropriate test statistic to test this hypothesis and calculate the test statistic. Present your answers in a summary table. (8)

(b) Determine the critical value that will help you decide whether you should reject the null hypothesis at **a significance level of 0,05,** or not. (1)

(c) Do you reject the null hypothesis? (1)

(d) Interpret your findings in terms of the original problem statement. (2)

QUESTION 5 [4]

A large manufacturing company has the option of merging with an international company. Management is concerned about the employees' reaction and has asked the opinion of management and line workers. Management wants to know if these two levels of employees have different opinions about the merger.

In the table below are the responses of the two groups to the following question:

Do you support the merger?

	YES	NO
Management	12	8
Line workers	7	9

The chi-square value is 0,94.

(a) Determine the critical value **for a significance level of 0,01**. (1)

(b) Do you reject the null hypothesis? (1)

(c) Is there a difference between the levels and their answer to the question? With how much certainty can you conclude this? (2)

TOTAL SECTION 2: [50]
GRAND TOTAL: [70]

AFDELING 1

(1) Watter maatstaf van sentrale neiging sal die meeste beïnvloed word deur een telling wat uitermate afwyk in 'n verspreiding?

Gebruik die inligting op die grafiek hieronder om vrae 2-4 te beantwoord
'n Lae beoordeling (bv. 1) dui op 'n baie negatiewe mening aangaande die bydrae tot die sosiale fonds, terwyl 'n hoë beoordeling (bv. 10) 'n baie positiewe mening toon.
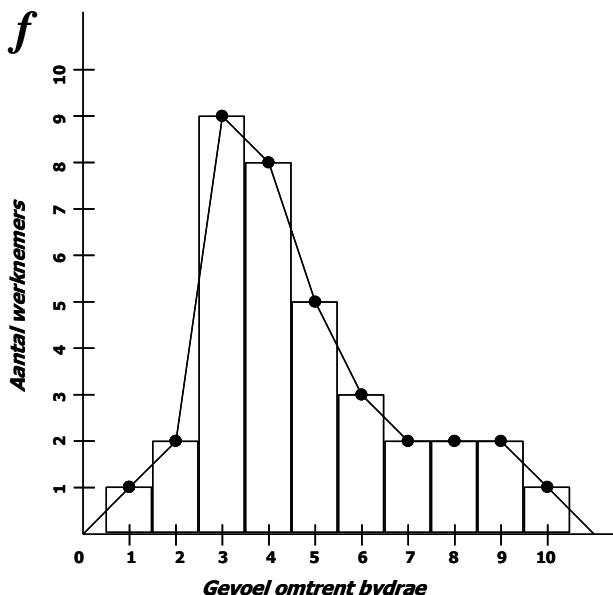
(2) Die modaliteit van die kurwe is _____?

(3) Hoeveel werknemers was betrokke in hierdie oefening?

(4) Hoeveel werknemers het die verpligte bydrae tot die sosiale fonds in die ekstreme punte (1 en 10) van die skaal beoordeel?

(5) Die mediaan vir die tellings 5, 5, 6, 8, 10, 10, 17 is _____?

(6) Die standaardafwyking vir *z*-tellings is altyd _____?

(7) Met 'n rigtinggewende alternatiewe hipotese sal jy 'n tweekantige toets gebruik. Is hierdie stelling waar of vals?

(8) 'n Navorser toets 'n groep seuns en 'n groep dogters met behulp van 'n statistiese aanlegtoets en kom tot die gevolgtrekking dat dogters 'n hoër statistiese aanleg as seuns het. Wat is die onafhanklike veranderlike in hierdie navorsingsvraag?

(9) Gegewe die data:
X: 23 16 31 29
Y: 11 19 8 10

$\sum(X)^2 =$

(10) Die letters P, Q, R en S is aan verskillende kursuskodes toegeken as etikette met geen versteekte betekenis daaragter nie. Die tipe metingskaal wat in hierdie geval gebruik word, is die _____?

(11) Dit is altyd nodig om die totale aantal tellings te hê om die gemiddelde te bereken. Is hierdie stelling waar of vals?

(12) Die volgende is die begeesteringstellings vir 'n paar IOP2601-studente [10, 2, 8, 13, 13, 9, 4, 6, 13, 18]. Wat is die omvang?

Gebruik die data in die tabel hieronder om vrae (13) tot (16) te beantwoord:

Klasinterval	Frekwensie	Kumulatiewe frekwensie	% Frekwensie	Kumulatiewe % frekwensie
75 - 80	5	70	7	100
69 - 74	10	?	14	93
63 - 68	14	55	?	79
57 - 62	15	41	21	?
51 - 56	13	26	19	38
45 - 50	13	13	19	19

(13) Die intervalgrootte vir hierdie verspreiding is _____.

(14) Die kumulatiewe frekwensie vir die klasinterval [69-74] is _____

(15) Die persentasie frekwensie vir die klasinterval [63-68] is _____.

(16) Die kumulatiewe persentasie frekwensie vir die klasinterval [57-62] is _____.

Twee departemente het vir 'n blokkiesraaiselkompetisie ingeskryf om R15 000 se pryse by 'n toonaangewende rekenaarhandelaar te wen. Departement A het 40 inskrywings ingestuur terwyl Departement B 37 ingestuur het. Die verslag van die administrateurs van die kompetisie is dat 500 inskrywings gekwalifiseer het en uit die oplossing wat voorsien is blyk dit dat altwee departemente gekwalifiseer het. Gebruik hierdie inligting om die volgende vrae [17-19] te beantwoord.

(17) Wat is die waarskynlikheid dat Departement A die eerste prys sal wen?

(18) Indien Departement A die eerste prys wen, wat is die waarskynlikheid dat Departement B die tweede prys sal wen? (Die eerste pryswenner se inskrywing word nie in die houer teruggeplaas nie).

(19) Wat is die waarskynlikheid dat die twee departemente die eerste en tweede prys sal wen?

(20) Dosente is geïnteresseerd daarin om te weet of ouer en jonger studente verskil in die mate waartoe hulle bereid is om moeite met hulle statistiek-studies te doen. Die resultate van 'n onafhanklike t-toets word hieronder weergegee. Die vlak van statistiese beduidendheid is 0.05. Let wel, die uitdruk is slegs in Engels soos wat dit in die statistiese verwerkingsprogram aangebied word. Gebruik dit om die vraag te beantwoord wat volg:

Group Statistics

	Age	N	Mean	Std. Deviation	Std. Error Mean
Effort	Younger	63	6.3757	.95131	.11985
	Older	171	6.3275	.99573	.07615

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Effort	Equal variances assumed	1.418	.235	.332	232	.740	.04818
	Equal variances not assumed			.339	115.300	.735	.04818

Is daar 'n statistiese beduidende verskil tussen jonger en ouer studente en die mate waartoe hulle bereid is om moeite te doen met hulle statistiek-studies?

TOTAAL AFDELING 1: [20]

AFDELING 2

VRAAG 1 [18]

'n Groot finansiële instelling het onlangs 'n nuwe telesentrum geopen om die meeste van die kliënte se navrae te hanteer. Voor die telesentrum geopen is, het die telefoonoperateurs intensiewe opleiding ondergaan ten einde hulle kommunikasievaardighede te verbeter. As die menslikehulpbronbeampte van die instelling wil jy nou weet of hierdie opleiding enige effek gehad het op die telefoonoperateurs se vermoë om die inkomende oproepe te hanteer. Jy versamel die tellings van 'n kommunikasievaardigheids-beoordeling wat aan die einde van die opleiding gedoen is en die aantal oproepe wat binne 'n uur suksesvol hanteer is. Nadat jy die data ontleed het, het jy die volgende uitgevind:

- Die verband tussen die kommunikasievaardigheids-beoordeling en die aantal oproepe wat suksesvol hanteer is, was **0,59**.
- Die gemiddelde van X (kommunikasievaardigheids-beoordeling) was **17,7** en die gemiddelde van Y (aantal oproepe wat suksesvol hanteer is) was **32,4**.
- Die helling was **0,85**.

Gebruik bogenoemde resultate om die volgende vrae te beantwoord:

(a) Interpreteer die korrelasiekoëffisiënt. (2)

(b) Watter afleiding kan gemaak word oor die aard van die verband? (1)

(c) Bereken die persentasie gemeenskaplike variansie tussen die twee stelle tellings en illustreer dit diagrammaties. (2)

Toe jy die resultate van die berekenings aan die menslikehulpbronnedepartement voorlê, het jy genoem dat jy 'n sekere formule kon gebruik om die telefoonoperateurs se vermoë om oproepe suksesvol te hanteer op grond van hulle kommunikasievaardigheids-beoordeling te voorspel.

(d) Wat is die waarde van die afsnit? (2)

(e)   Bereken 'n telefoonoperateur se vermoë om oproepe suksesvol te hanteer met 'n kommunikasie-vaardigheids-beoordeling van 15.   (1)

(f)   Gee 'n grafiese voorstelling van die regressielyn deur onderskeidelik die afsnit en die voorspelde waarde van die telefoonoperateur met 'n kommunikasievaardigheids-beoordeling van 15 daarop aan te dui.   (5)

Die telefoonoperateurs het 'n vraelys voltooi om hul persepsie van die effektiwiteit van die kommunikasievaardigheidsopleiding, te meet. Die minimum telling wat hulle kon kry, was 45 (wat aandui dat die program glad nie effektief is nie) en die maksimum telling was 80 (wat aandui dat die program baie effektief is). Gebruik die frekwensieverspreidingstabel hieronder om die volgende berekenings te doen:

Klasinterval	Frekwensie	Kumulatiewe frekwensie	% Frekwensie	Kumulatiewe % frekwensie
75 - 80	7	110	6	100
69 - 74	11	103	10	94
63 - 68	23	92	21	84
57 - 62	25	69	23	63
51 - 56	30	44	27	40
45 - 50	14	14	13	13

(g)   Wat is die persentasie van die telefoonoperateurs wat onder 'n telling van hoë effektiwiteit val? Met ander woorde, bepaal die persentielrang van 'n telling van 68.   (3)

(h)   Wat is die telling wat 55% van al die telefoonoperateurs behaal het? Met ander woorde, watter telling kom by die 55ste persentiel voor?   (2)

VRAAG 2   [6]

Jy het inligting ingesamel oor hoeveel jou medestudente myUnisa in hulle bestudering van hierdie module gebruik het. Hulle moes vyf vrae volgens 'n vyfpuntskaal beantwoord. Jy werk met 'n normaal verspreide populasie met 'n gemiddeld (μ) van 4, 'n standaardafwyking (σ) van 2 en 'n aantal gevalle (N) van 10. Beantwoord die volgende vrae:

(a)   Wat is die **proporsie** van studente met 'n routelling van groter as 9?   (2)

(b)   Wat is die **persentasie** van studente met 'n routelling van groter as 3?   (2)

(c)   Wat is die **aantal** studente met routellings tussen 3 en 9?   (2)

VRAAG 3   [10]

Jy wil vasstel of 'n nuwe winsdelingskema enige effek op die werkverrigting van werknemers in jou organisasie sal hê. Om dit te bepaal, het jy twee groepe (Groep A en Groep B) met 10 werknemers elk ewekansig gekies. Elke werknemer in Groep A is **afgepaar** met 'n ander werknemer in Groep B op grond van hul hiërargievlakke in die organisasie.

Die winsdelingskema is slegs geïmplementeer vir Groep A werknemers en NIE vir Groep B werknemers nie. Na ses maande het jy die werkverrigting van die werknemers in Groep A en Groep B gemeet.

GROEP A	GROEP B
10	6
8	5
7	6
9	4
6	3
8	4
8	3
5	4
9	5
7	5

Jy wil nou vasstel of daar 'n betekenisvolle verskil is tussen die tellings van Groep A en Groep B. Jy het besluit op 'n beduidendheidsvlak van $α = 0,05$.

(a)   Formuleer 'n gepaste nulhipotese (H_0) in simbole.   (1)

(b)   Formuleer 'n gepaste alternatiewe hipotese (H_1) in simbole.   (1)

(c)   Aanvaar dat jou data normaal versprei is. Kies 'n gepaste statistiese toets en bereken die toetsstatistiek. Toon ALLE berekeninge!   (3)

$\bar{D} = 3,2$	$s_D = 2,18$

(d)   Bepaal die vryheidsgraad.   (1)

(e)   Bepaal die kritieke waarde vir 'n tweekantige toets vir beduidendheidsvlak van 5% (0,05).   (1)

(f)   Interpreteer die resultate ten aansien van die verwerping of nie-verwerping van die nulhipotese.   (1)

(g)   Interpreteer jou verwerping of nie-verwerping van die nulhipotese in gewone taal volgens die oorspronklike probleemstelling. Met hoeveel sekerheid kan jy hierdie gevolgtrekking maak?   (2)

VRAAG 4   [12]

As 'n bedryfsielkundige word jy gevra om 'n klimaatstudie in 'n groot organisasie te doen. Soos wat jy met die studie vorder, raak jy geïnteresseerd in die invloed daarvan om in verskillende sektore van die organisasie te werk met die houding van die werknemers teenoor die organisasie. Jy ondervra 'n paar mense in drie verskillende sektore (bemarking, rekeningkunde en produksie) oor hulle houding teenoor die organisasie. Die resultate word in die tabel hieronder weergegee ('n hoër telling dui op 'n meer positiewe houding).

BEMARKING	REKENINGKUNDE	PRODUKSIE
2	6	3
4	4	5
1	7	6
1	3	8
5	5	9
$\bar{X} = 2,6$	$\bar{X} = 5,0$	$\bar{X} = 6,2$
Total mean		
	$\bar{X} = 4,6$	
	$\Sigma X = 69$	
	$\Sigma X^2 = 397$	

In jou verslag aan bestuur beantwoord jy die volgende vraag: Is daar 'n beduidende verskil in die verskillende werknemers se houding teenoor die organisassie? Anders gestel, jy toets die volgende nulhipotese:

$$H_0 : \mu_{GR1} = \mu_{GR2} = \mu_{GR3} \text{ with } \alpha = 0,05$$

(a)   Kies 'n gepaste statistiese toets om hierdie hipotese te toets en bereken die toetsstatistiek. Gee jou antwoorde in 'n opsommingstabel weer.   (8)

(b)   Bepaal die kritiese waarde wat jou gaan help om te besluit of jy die nulhipotese op 'n **beduidendheidsvlak van 0,05** moet verwerp of nie.   (1)

(c)   Verwerp jy die nulhipotese?   (1)

(d)   Interpreteer jou bevindinge in die lig van die oorspronklike probleemstelling.   (2)

VRAAG 5   [4]

'n Groot vervaardigingsmaatskappy het die opsie om met 'n internasionale maatskappy in die industrie saam te smelt. Bestuur is bekommerd oor die werknemers se reaksie en het die opinie van die bestuur en lynwerkers oor die samesmelting gevra.

In die tabel hieronder word die antwoorde van die twee groepe op die volgende vraag weergegee:

Ondersteun jy die samesmelting?

	JA	NEE
Bestuur	12	8
Lynwerkers	7	9

Die chi-kwadraat waarde is 0,94.

(a)   Bepaal die kritiese waarde **vir 'n beduidenheidsvlak van 0,01**.   (1)

(b)   Verwerp jy die nulhipotese?   (1)

(c)   Is daar 'n verskil tussen die groepe en hulle antwoord op die vraag? Met hoeveel sekerheid kan jy hierdie gevolgtrekking maak?   (2)

TOTAAL AFDELING 2: [50]

GROOTTOTAAL: [70]

**EXAMINATION PAPER MEMORANDUM /** *EKSAMENVRAESTEL MEMORANDUM*

SECTION 1

Question	Answer	Question	Answer
1	Mean / *Gemiddeld*	11	True / *Waar*
2	Unimodal / *unimodaal*	12	16
3	35	13	6
4	2	14	65
5	8	15	20
6	1	16	59
7	False / *Vals*	17	0,08
8	Gender (boys and girls) / *Geslag (seuns en dogters)*	18	0,07
9	9801	19	0,308
10	Nominal / *Nominale*	20	No / *Nee*

SECTION 2

QUESTION 1

(a)   0,59 **moderate positive relationship**   (2)

(b)   Deduction: the better the telephone operators' communication skills, the better the number of calls handled successfully.   (1)

(c)   common variance: r = 0,59
$$r^2 = 0,3481 \times 100\%$$
$$\mathbf{r^2 = 34,81\%}$$ (2)
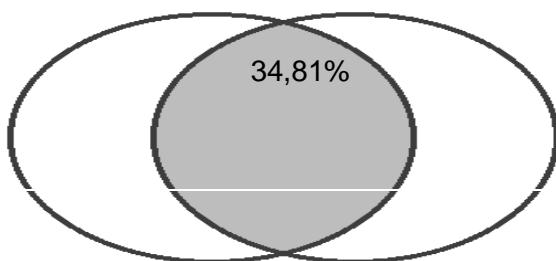
(d) intercept: $a = \overline{Y} - b\,\overline{X}$

      = 32,4 – (0,85) (17,7)
      = 32,4 – 15,045
      = 17,355
      = 17,36   (2)

(e) regression : $\hat{Y} = bX + a$
     = (0,85)15 + 17,36
     = 30,11   (1)
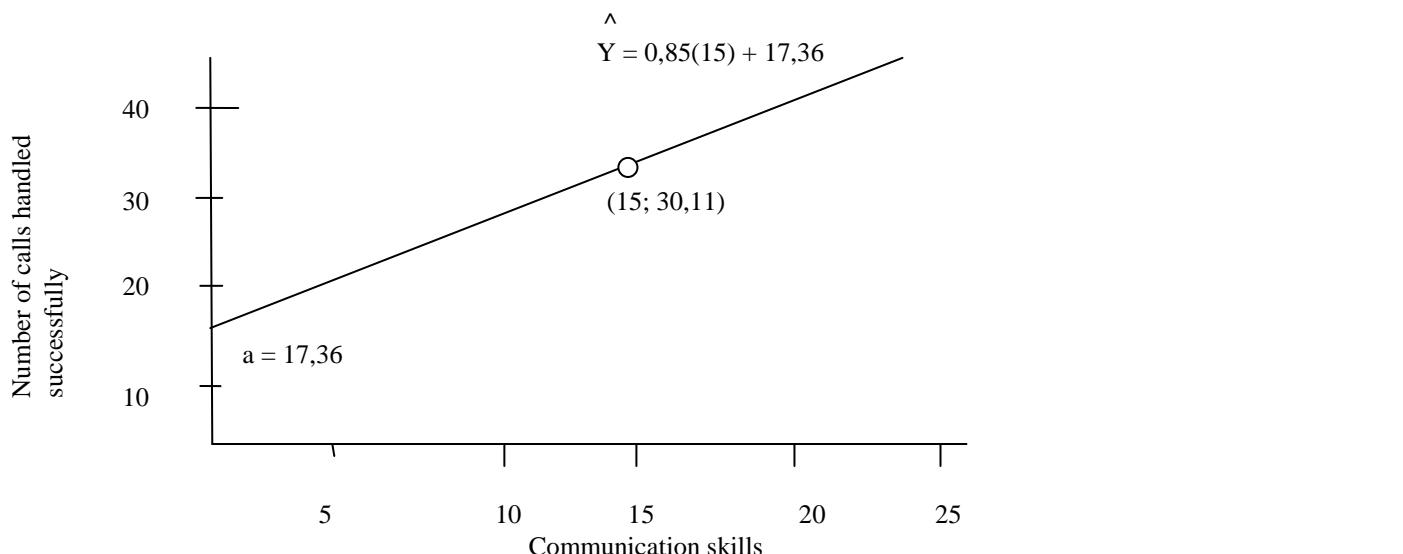
(f) Regression line   (5)

Class interval	Frequency	Cumulative frequency	% Frequency	Cumulative % frequency
75 - 80	7	110	6	100
69 - 74	11	103	10	94
63 - 68	23	92	21	84
57 - 62	25	69	23	63
51 - 56	30	44	27	40
46 - 50	14	14	13	13

(g) Percentile rank = 68   (3)

$$\text{percentile rank} = \text{\% below} + \frac{\text{score} - \text{RLL}}{\text{classint. width}} \,(\text{interval \%})$$

      = $63 + \dfrac{68 - 62,5}{6}(21)$

      = $63 + \dfrac{5,5}{6}(21)$

      = 63 + 19,249
      = 82,25

31

(h) 55th percentile

score of p   = RLL + $\frac{PR - \% \text{ below}}{\text{interval \%}}$ (interval width) (2)

= 56,5 + $\frac{55 - 40}{23}$ (6)

= 56,5 + $\frac{15}{23}$ (6)

= 56,5 + 0,652 (6)

= 56,5 + 3,912

= 60,41

QUESTION 2 [6]

You collected information from your fellow students on how much they have used myUnisa in studying this module by asking them for a rating on a 5-point scale on five different questions. Given a normally distributed population with a mean (μ) of 4, a standard deviation (σ) of 2, and 10 as the number of cases (N), answer the following questions:

(a) What is the **proportion** of students with a raw score larger than 9? (2)

$z = \frac{X - \mu}{\sigma}$

$= \frac{9 - 4}{2}$

$= \frac{5}{2}$

= **2,5**
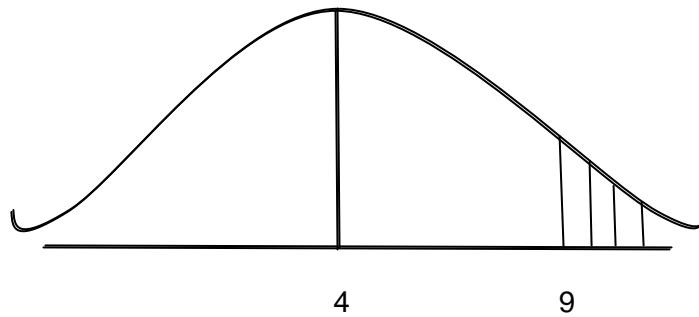
Proportion/*Proporsie* = **0,00621**

(b) What is the **percentage** of students with a raw score larger than 3? (2)

$z = \frac{X - \mu}{\sigma}$

$= \frac{3 - 4}{2}$

$= \frac{-1}{2}$

= -0,5
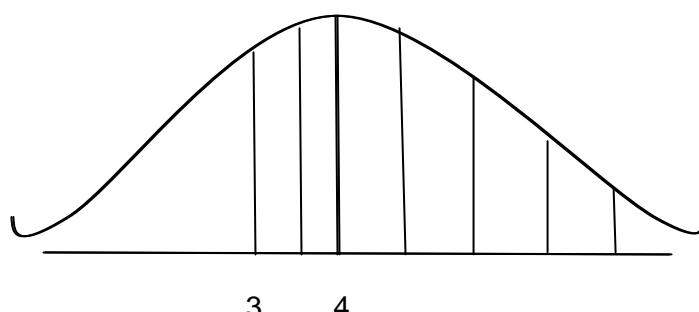
Proportion/*Proporsie* = **0,69146**

Percentage = 69,15**%**

(c) What is the **number** of students with raw scores between 3 and 9? (2)

X = 9: Mean to Z score = 0,49379

X = 3 : Mean to Z score = 0,19146

Total = **0,68525**

0,68525 x 10 people = 6,97

= **7 people**
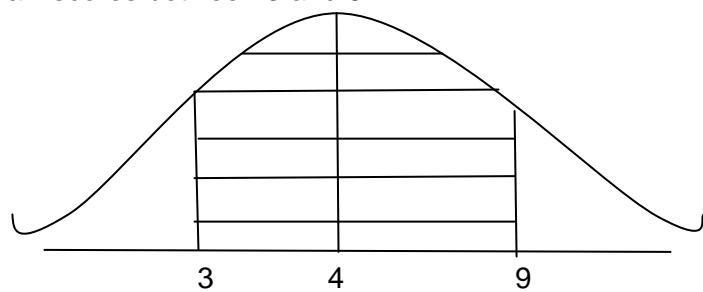
QUESTION 3 [10]

Data

Group A	Group B	D	D2
10	6	4	16
8	5	3	9
7	6	1	1
9	4	5	25
6	3	3	9
8	4	4	16
8	3	5	25
5	4	1	1
9	5	4	16
7	5	2	4
$\Sigma X = 77$	$\Sigma Y = 45$	32	122
		$\overline{D} = 3,2$ $S_D = 2,18$	

(a) H_0 : $\mu_A = \mu_B$ (1)

(b) H_1 : $\mu_A \neq \mu_B$ (1)

(c)

$$t = \frac{\overline{D} - 0}{\frac{S_D}{\sqrt{N}}}$$ (1)

$$= \frac{3,2 - 0}{\frac{2,18}{\sqrt{10}}}$$ (1)

$$= \frac{3,2}{2,18}$$

33

$\overline{3,162}$

$$= \frac{3,2}{0,689}$$

4,64   (1)

(d) df = $N - 1$

       =   10 - 1
       =   9   (1)

(e) $t_{0.05}(9)$ =   2,2622   (1)

(f)   4,64 > 2,2622
  ∴ *Reject/ Verwerp* H_0 (1)

(g)   It can be concluded with 95 % certainty that there is a difference in the job performance of Group A as compared to the job performance of Group B.   (2)

QUESTION 4   **[12]**

Data

X_1	X_2	X_3	X^2_1	X^2_2	X^2_3
2	6	3	4	36	9
4	4	5	16	16	25
1	7	6	1	49	36
1	3	8	1	9	64
5	5	9	25	25	81
$\Sigma X_1 = 13$	$\Sigma X_2 = 25$	$\Sigma X_3 = 31$	$\Sigma X^2_1 = 47$	$\Sigma X^2_2 = 135$	$\Sigma X^2_3 = 215$
$\overline{X} = 2,6$	$\overline{X} = 5,0$	$\overline{X} = 6,2$			
Total $\Sigma X = 13 + 25 + 31 = 69$ $\Sigma X^2 = 47 + 135 + 215 = 397$ $\overline{X} = 4,6$					

$$SS_{total} = \Sigma X^2 - \frac{(\Sigma X)^2}{N} \qquad\qquad df = N - 1$$

$$= 397 - \frac{(69)^2}{15} \qquad\qquad\qquad = 15 - 1$$
$$\qquad\qquad\qquad\qquad\qquad\qquad = 14$$

$$= 397 - \frac{4761}{15}$$

$$= 397 - 317{,}4$$

$$= 79{,}6$$

$$SS_{group} = n\Sigma(\bar{X}_j - \bar{X}..)^2 \qquad\qquad df = k - 1$$

$$= 5[(2{,}6 - 4{,}60)^2 + (5{,}0 - 4{,}60)^2 + (6{,}2 - 4{,}60)^2] \qquad = 3 - 1$$

$$= 5[(-2{,}0)^2 + (0{,}40)^2 + (1{,}60)^2] \qquad\qquad = 2$$

$$= 5[(4{,}0) + (0{,}16) + (2{,}56)]$$

$$= 5[6{,}72]$$

$$= 33{,}6$$

$$SS_{error} = SS_{total} - SS_{group} \qquad\qquad df = k(n - 1)$$

$$= 79{,}6 - 33{,}6 \qquad\qquad\qquad\qquad = 3(5 - 1)$$

$$= 46 \qquad\qquad\qquad\qquad\qquad\qquad = 12$$

$$MS_{group} = SS_{group} / df_{group}$$

$$= 33{,}6 / 2$$

$$= 16{,}80$$

$$MS_{error} = SS_{error} / df_{error}$$

$$= 46 / 12$$

$$= 3{,}83$$

$$F = \frac{MS_{group}}{MS_{error}}$$

$$= \frac{16{,}80}{3{,}83}$$

$$= 4{,}386$$

Source/*Bron*	df	SS	MS	F
Groups/*Groepe* **Error/*Fout***	2 12	33,60 46,0	16,80 3,83	4,39
Total/*Totaal*	14	79,60		

(8)

$F_{0,05}$ (2,12) = 3,89

(1)

4,39 > 3,89

$\therefore$ Reject/*Verwerp* (1)

There **is a significant difference** in the attitude toward the organisation among employees working in different sectors. This can be said **with 95% certainty**. (2)

QUESTION 5 **[4]**

(a) *df* = (*R* – 1)(*C* – 1)

  = (2 - 1) (2 - 1)

  = 1

$\chi^2_{0.01}$ (1) = 6,6349 (1)

(b) 0,94 < 6,6349

  $\therefore$ **Do not reject** / *Moet nieverwerp nie* (1)

There are **no significant differences** between the opinions of management and line workers regarding the merger. This can be said **with 95% certainty**. (2)

5 CONCLUSION / *SLOT*

Best of luck with your preparation for the examination.
Sterkte met jou voorbereiding vir die eksamen.

Regards
Vriendelike groete

Your IOP2601 lecturers
Jou IOP2601 dosente

Ms Nomfusi Bekwa
Prof Llewellyn van Zyl