

Tutorial Letter 201/2/2014 / Studiebrieff 201/2/2014

Organisational Research Methodology *Organisasie navorsingsmetodologie*

IOP2601

Department of Industrial and Organisational Psychology

Departement Bedryf- en Organisasiesielkunde

This tutorial letter contains important information about your module.

Hierdie studiebrieff bevat belangrike inligting oor jou module.

BAR CODE

CONTENTS / INHOUD

- 1 Feedback on Assignment 01 / Terugvoering oor Werkopdrag 01**
- 2 Feedback on Assignment 02 / Terugvoering oor Werkopdrag 02**
- 3 Examination information / Eksameninligting**
- 4 Appendix: Examination paper / Bylae: Eksamenvraestel**
- 5 Conclusion / Slot**

Dear Student

This tutorial letter contains feedback on Assignments 01 and 02, and model answers. Please pay special attention to the mark allocation. The correct answers to multiple-choice questions are supplied and discussed. Compare your answers with the memoranda to see where you have made mistakes. Remember that feedback on Assignment 03 is given in the study guide.

The tutorial letter also includes more information on the examination. A copy of the October/November 2013 examination paper is attached (see the appendix). Work through it to get an idea of what will be expected of you in the examination.

Geagte Student

Hierdie studiebrief bevat terugvoering oor Werkopdrag 01 en 02, en modelantwoorde. Let asseblief goed op na die puntetoekenning. Die korrekte antwoorde op die meerkeusevrae word gegee en bespreek. Vergelyk jou werkopdragantwoorde met die memoranda om te sien waar jy gefouteer het. Onthou, die terugvoering oor Werkopdrag 03 verskyn in die studiegids.

Die studiebrief verskaf ook verdere inligting oor die eksamen. 'n Afskrif van die Oktober/November 2013-vraestel is aangeheg (sien die bylae). Werk deur die vraestel sodat jy kan sien wat in die eksamen van jou verwag kan word.

1. FEEDBACK ON ASSIGNMENT 01 / TERUGVOERING OOR WERKOPDRAG 01
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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 Descriptive Statistics before you continue with the next assignment on the rest of Descriptive Statistics and Inferential Statistics.

Hierdie werkopdrag is die eerste verpligte werkopdrag wat jy moes indien en dit tel 10% van jou finale punt. Die berekening van die finale punt word op bladsy 11 in Studiebrieff IOP2601/101/3/2014 verduidelik.

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

QUESTION / VRAAG 1-30	[30]
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The correct answers are given in **the second column** next to each question number. Die korrekte antwoorde verskyn in **die tweede kolom** langs elke vraagnommer.

Item	Answer / Antwoord	Comments / Kommentaar
1	2	Inferential Statistics is applicable here, because a sample is being used to make inferences about the population. <i>Inferensiële Statistiek is hier van toepassing, want 'n steekproef word gebruik om gevolgtrekkings oor 'n populasie te maak.</i>
2	3	The research process is discussed on page 5 of the study guide. Note the sequence of the steps followed. <i>Die navorsingsproses word op bladsy 5 van die studiegids bespreek. Let op die volgorde van die stappe wat gevolg word.</i>
3	3	The 85 members represent the total members who are of interest to the research; they are the population. See Tredoux and Durrheim (2002, 2013) for a definition, and some activities on pages 21 and 22 of the study guide. <i>Die 85 lede verteenwoordig die totale aantal lede waarop die navorsing van toepassing is; hulle is dus die populasie. Sien Tredoux en Durrheim (2002, 2013) vir die definisie, en die aktiwiteite op bladsy 21 en 22 in die studiegids.</i>
4	2	The subset of the population and the members selected for evaluation are 30 members, representing the sample. See Tredoux and Durrheim (2002, 2013) for a definition, and some activities on pages 21 and 22 of the study guide.

Item	Answer / Antwoord	Comments / Kommentaar
		<p><i>Die substel van die populasie en die 30 lede wat gekies is vir evaluering verteenwoordig die steekproef. Sien Tredoux en Durrheim (2002, 2013) vir die definisie, en die aktiwiteite op bladsy 21 en 22 in die studiegids.</i></p>
5	4	<p>The difference between independent and dependent variables is discussed on page 13 of Tredoux and Durrheim (2002, 2013); activities relating to these variables appear on pages 17 and 20 of the study guide. Performance is the dependent variable, because whether members of the organisation work in the office or work from home presumably affects performance.</p> <p><i>Die verskil tussen die onafhanklike en afhanklike veranderlikes word op bladsy 13 in Tredoux en Durrheim (2002, 2013) bespreek; aktiwiteite oor veranderlikes verskyn op bladsy 17 en 21 in die studiegids. Prestasie is die afhanklike veranderlike omdat dit waarskynlik beïnvloed word deur die feit dat lede van die organisasie óf by die kantoor óf by die huis werk.</i></p>
6	3	<p>The type of work environment (office or home) has none of the properties of measurement; therefore the nominal scale is the correct scale. Measurement scales are discussed on pages 11 and 12 of Tredoux and Durrheim (2002, 2013); activities relating to measurement scales appear on pages 19 to 21 of the study guide.</p> <p><i>Die tipe werksomgewing (kantoor of huis) het geen eienskappe van meting nie, dus is die nominale skaal die korrekte skaal. Metingskale word bespreek op bladsy 11 en 12 van Tredoux en Durrheim (2002, 2013); aktiwiteite oor metingskale verskyn op bladsy 19 tot 21 in die studiegids.</i></p>
7	1	<p>The Real Lower Limit (RLL) can be found halfway between 3 (from the class interval that would be before 4–6) and 4 (from the class interval of interest of 4–6). The RLL for the class interval 4–6 is 3,5. See page 24 of Tredoux and Durrheim (2002, 2013), and page 38 of the study guide for discussions about the RLL. The activities are on page 40 of the study guide.</p> <p><i>Die Werklike Ondergrens (WOG) word halfpad aangetref tussen 3 (van die naburige klasinterval wat voor 4–6 val) en 4 (van die klasinterval van belang van 4–6). Die WOG vir die klasinterval 4–6 is 3,5. Sien bladsy 24 van Tredoux en Durrheim (2002, 2013), en bladsy 38 in die studiegids vir besprekings hiervan. Die aktiwiteite verskyn op bladsy 40 in die studiegids.</i></p>
8	4	<p>The real upper limits are discussed in the same section as the RLL above (question 7). The Real Upper Limit (RUL) for class interval 10–12 is 12,5.</p>

Item	Answer / Antwoord	Comments / Kommentaar
		<p><i>Die werklike bogrens word in dieselfde afdeling as die WOG hierbo (vraag 7) bespreek. Die werklike bogrens (WBG) vir klasinterval 10–12 is 12,5.</i></p>
9	2	<p>If you check the computational formulas for both the variance and the standard deviation, you will see that there is no need to calculate the mean first, therefore the statement is false. Remember, only the computational formula is used for the calculation; the definitional formula is not used.</p> <p><i>Indien jy die formules vir die variansie én die standaardafwyking bestudeer, sien jy daar is geen rede om eers die gemiddelde te bereken nie. Die stelling is dus vals. Onthou, slegs die berekeningsformule word vir die berekening gebruik; die definisieformule word nie gebruik nie.</i></p>
10	1	<p>See page 70 of the study guide for a complete summation table. The $\sum X^2$ means all the values in the column X^2 are added up.</p> <p>Remember, there is a difference between $\sum X^2$ and $(\sum X)^2$.</p> <p>Always double-check your calculations for the summation table because the answers you get are the ones used in all your substitutions for formulas, which means if there is an error in one score, it will have an impact on all the subsequent calculations where you use that score.</p> <p>$9+4+9+16+1+49+25+36+9+16 = 174$</p> <p><i>Sien bladsy 71 in die studiegids vir die volledige sommasietabel. Die $\sum X^2$ beteken al die waardes in die kolom X^2 word opgetel.</i></p> <p><i>Onthou, daar is 'n verskil tussen $\sum X^2$ en $(\sum X)^2$.</i></p> <p><i>Maak altyd dubbeld seker dat jou berekenings vir die sommasietabel korrek is, want die antwoorde wat jy kry gebruik jy weer vir al die substitusies in die daaropvolgende berekenings. As daar 'n fout in een telling is, het dit 'n impak op al die daaropvolgende berekenings waar jy van die telling gebruik maak.</i></p> <p>$9+4+9+16+1+49+25+36+9+16 = 174$</p>
11	3	<p>$(\sum X)^2$ is the sum total of all the scores in column X. Square the total. In this case $\sum X = 38$; and the square of that is $(38 \times 38) = 1\ 444$.</p> <p><i>$(\sum X)^2$ is die somtotaal van al die tellings in kolom X. Vermenigvuldig die getal (die antwoord) met homself (Kwadraat). In hierdie geval is $\sum X = 38$; en die kwadraat is $(38 \times 38) = 1\ 444$.</i></p>

Item	Answer / Antwoord	Comments / Kommentaar
12	1	<p>Add all the scores in column X to get $\sum X$; and do the same with the scores in column Y to get $\sum Y$. Then multiply the totals. Therefore $(\sum X)(\sum XY) = 38 \times 58 = \mathbf{2\ 204}$.</p> <p>Remember, there is a difference between $\sum XY$ and $(\sum X)(\sum Y)$.</p> <p><i>Tel al die tellings in kolom X op om $\sum X$ te kry; en doen dieselfde met die tellings in kolom Y om $\sum Y$ te kry. Vermenigvuldig dan die totale. Dus is $(\sum X)(\sum XY) = 38 \times 58 = \mathbf{2\ 204}$.</i></p> <p><i>Onthou, daar is 'n verskil tussen $\sum XY$ en $(\sum X)(\sum Y)$.</i></p>
13	2	<p>The mode is the most frequently occurring score in a distribution. For Y, the scores from 3, <u>4, 4</u>, 5, <u>6, 6</u>, <u>7, 7</u>, <u>8, 8</u> that occur most frequently are 4, 6, 7 and 8. Each of these scores occurs twice. See study unit 5, pages 53 and 54 of the study guide for the definition and activities.</p> <p><i>Die modus is die getal wat die meeste in 'n datastel voorkom. Vir Y is 4, 6, 7 en 8 die tellings wat die meeste voorkom in 3, <u>4, 4</u>, 5, <u>6, 6</u>, <u>7, 7</u>, <u>8, 8</u>. Elk van dié tellings kom twee keer voor. Sien studie-eenheid 5, bladsy 55 en 56 in die studiegids vir die definisie en aktiwiteite.</i></p>
14	3	<p>To ensure that you have the correct median, calculate the median location. Before calculating the median location it is always better to rank the scores in ascending order (array): 3 4 4 5 6 6 7 7 8 8.</p> <p>Median location: $(N+1) / 2 = (10 + 1) / 2 = 11 / 2 = 5,5$th position; therefore the median will be in the middle of 6 and 6, which is equal to 6.</p> <p>The median is discussed on pages 45 and 46 of the prescribed book. Do the activities on page 52 of the study guide.</p> <p><i>Om te sorg dat jy die korrekte mediaan het, bereken die mediaan se posisie in die datastel. Voor 'n mens die mediaanposisie bereken, is dit altyd beter om die tellings in 'n stygende volgorde te rangskik (skikking): 3 4 4 5 6 6 7 7 8 8.</i></p> <p><i>Mediaanposisie: $(N + 1) / 2 = (10 + 1) / 2 = 11/2 = 5,5$de posisie, dus is die mediaan in die middel van 6 en 6. Dit is dus gelyk aan 6.</i></p> <p><i>Die mediaan word bespreek op bladsy 53 en 54 in die voorgeskrewe boek. Doen die aktiwiteite op bladsy 53 in die studiegids.</i></p>
15	1	<p>The mean of X: / Die gemiddelde van X:</p> $\bar{X} = \sum X / N = 38 / 10 = 3,8$ <p>See page 41 of the prescribed book for an explanation. The exercises are on page 50 of the study guide.</p> <p><i>Sien bladsy 41 van die voorgeskrewe boek vir 'n verduideliking. Die oefeninge is op bladsy 52 in die studiegids.</i></p>

Item	Answer / Antwoord	Comments / Kommentaar
16	3	<p>The standard deviation is discussed on pages 60 and 61 of the prescribed book. The equation 4.7 on page 62 of the prescribed book is relevant to the calculations of the standard deviation. Complete the activities on pages 61 and 62 of the study guide.</p> <p><i>Die standaardafwyking word op bladsy 60 en 61 in die voorgeskrewe boek bespreek. Die vergelyking 4.7 op bladsy 62 in die voorgeskrewe boek is van toepassing op die berekening van die standaardafwyking. Doen die aktiwiteite op bladsy 62 en 63 in die studiegids.</i></p>
17	1	<p>The range is the difference between the highest score [7] and the lowest score [1], therefore, $7 - 1 = 6$. The range is discussed on page 54 of Tredoux and Durrheim (2002, 2013) and page 59 of the study guide. The activities appear on pages 59 and 60 of the study guide.</p> <p><i>Die omvang / reikwydte is die verskil tussen die hoogste telling [7] en die laagste telling [1], dus $7 - 1 = 6$. Die omvang / reikwydte word op bladsy 54 in Tredoux en Durrheim (2002, 2013) en bladsy 59 in die studiegids bespreek. Die aktiwiteite verskyn op bladsye 60 en 61 in die studiegids.</i></p>
18	2	<p>The intercept is depicted by the symbol a. <i>Die afsnit word voorgestel deur die a-simbool.</i></p> $a = \bar{Y} - b\bar{X}$ $= 5,8 - (0,26)(3,8)$ $= 5,8 - 0,988 \text{ (do not round off / moenie afrond nie)}$ $= 4,812$ $= \mathbf{4,81} \text{ (round off / rond af)}$ <p>The regression equation and all its elements are discussed on pages 82 to 84 of the study guide.</p> <p><i>Die regressievergelyking en al sy elemente word op bladsy 84 tot 87 in die studiegids bespreek.</i></p>
19	2	<p>A coefficient of $-0,67$ is moderate and negative. The scale of interpretation appears on page 73 of the study guide.</p> <p><i>'n Koëffisiënt van $-0,67$ is matig en negatief. Die interpretasieskaal verskyn op bladsy 74 in die studiegids.</i></p>
20	3	<p>The correlation coefficient has to be squared to get the common variance. Therefore $(-0,15)^2 = 0,0225 \times 100 = 2,25\%$. See page 74 of the study guide for an explanation of the common variance.</p> <p><i>Die korrelasiekoëffisiënt is die kwadraat van die gemeenskaplike variansie. Dus is $(-0,15)^2 = 0,0225 \times 100 = 2,25\%$. Die gemeenskaplike variansie word op bladsy 75 in die studiegids verduidelik.</i></p>

Item	Answer / Antwoord	Comments / Kommentaar
21	2	<p>If you add the values in the frequency column, you get $N = 65$. You also get the answer if you look at the cumulative frequency column, as this entails adding up the scores of the distribution. Cumulative frequency is discussed on pages 25 and 26 of Tredoux and Durrheim (2002, 2013).</p> <p><i>As jy die waardes in die frekwensiekolom optel, kry jy $N = 65$. Jy kry ook die antwoord as jy na die kumulatiewefrekwensie-kolom kyk, want dit behels die sommasie van die tellings van die verspreiding. Kumulatiewe frekwensie word bespreek op bladsy 25 en 26 in Tredoux en Durrheim (2002, 2013).</i></p>
22	3	<p>Study unit 4, pages 44 to 48 of study guide <i>Studie-eenheid 4, bladsye 45 tot 48 in die studiegids</i></p> <p>Percentile / <i>persentiel</i> rank = % below + $\frac{\text{score} - \text{RLL}}{\text{class int width} / \text{klasintervalbreedte}}$ (interval %)</p> $= 69 + \frac{65 - 60,5}{5} (15)$ $= 69 + \frac{4,5}{5} (15)$ $= 69 + 0,9(15)$ $= 69 + 13,5$ $= \mathbf{82,5}$
23	3	<p>Study unit 4, pages 44 to 48 of the study guide <i>Studie-eenheid 4, bladsye 45 tot 48 in die studiegids</i></p> <p>Score of p = $\text{RLL} / \text{WOG} + \frac{\text{PR} - \% \text{ below}}{\text{Interval\%}}$ (interval width/ <i>intervalwydte</i>)</p> $= 55,5 + \frac{60 - 40}{29} (5)$ $= 55,5 + 0,6896 (5)$ $= 55,5 + 3,448$ $= 58,948$ $= \mathbf{58,95}$ (rounded off / <i>afgerond</i>)
24	3	<p>The relationship is statistically significant between sense of coherence (SOC) and exhaustion at ($p < 0,01$ level (2-tailed) with a coefficient of $-0,530$. The significance value in the table must be less than 0,01 to indicate a significant relationship. Refer to pages 77 and 78 of the study guide.</p> <p><i>Die verband is statisties beduidend tussen koherensiesin (SOC) en uitputting (exhaustion) op 'n vlak van ($p < 0,01$ (2-kantig) met 'n koëffisiënt van $-0,530$. Die beduidendheidswaarde moet minder as 0,01 wees om 'n beduidende verband aan te dui. Raadpleeg bladsy 79 in die studiegids.</i></p>

Item	Answer / Antwoord	Comments / Kommentaar
25	1	<p>Look at the formula for the Y intercept. As you will see, the formula has both the mean of X and the mean of Y. See pages 83 and 195 of the study guide.</p> $a = \bar{Y} - b\bar{X}$ <p><i>Kyk na die formule vir die Y-afsnit. Die formule bevat die gemiddeld van X én die gemiddeld van Y. Raadpleeg bladsy 85 en 203 in die studiegids.</i></p>
26	1	<p>See the information provided on frequently asked questions on page 41 of Tutorial letter IOP2601/101/3/2014.</p> <p><i>Raadpleeg die inligting wat verskaf word oor hoëfrekwensievrae op bladsy 41 in Studiebriëf IOP2601/101/3/2014.</i></p>
27	1	<p>See the information about the examination on page 41 of Tutorial letter IOP2601/101/3/2014.</p> <p><i>Raadpleeg die inligting oor die eksamen op bladsy 41 in Studiebriëf IOP2601/101/3/2014.</i></p>
28	2	<p>Feedback on Assignments 01 and 02 will be sent to students in a tutorial letter after the closing date for Assignment 02. See pages 8 and 10 of Tutorial letter IOP2601/101/3/2014.</p> <p><i>Terugvoer oor Werkopdrag 01 en 02 word aan studente gestuur in 'n studiebriëf ná die sluitingsdatum vir Werkopdrag 02. Raadpleeg bladsy 8 en 10 in Studiebriëf IOP2601/101/3/2014.</i></p>
29	2	<p>Assignment 03 must NOT be submitted. See the assessment plan for Assignment 03 on page 10 of Tutorial letter IOP2601/101/3/2014.</p> <p><i>Werkopdrag 03 moet NIE ingegee word nie. Raadpleeg die assesseringsplan vir Werkopdrag 03 op bladsy 10 in Studiebriëf IOP2601/101/3/2014.</i></p>
30	2	<p>See section 8.2.2 on page 11 of Tutorial letter IOP2601/101/3/2014 for a discussion on submitting assignments.</p> <p><i>Die indiening van werkopdragte word bespreek in afdeling 8.2.2 op bladsy 11 in Studiebriëf IOP2601/101/3/2014.</i></p>

TOTAL / TOTAAL: [30]

2. FEEDBACK ON ASSIGNMENT 02 / TERUGVOERING OOR WERKOPDRAG 02

Assignment 02 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.

A full memorandum is included in this tutorial letter. Compare your answers with the memorandum and make sure that you understand the sections of Descriptive Statistics and Inferential Statistics that are covered in this assignment.

Werkopdrag 02 is die tweede verpligte werkopdrag wat jy moes indien en tel 10% van jou finale punt. Ons verduidelik op bladsy 11 in Studiebrieff IOP2601/101/3/2014 hoe die finale punt bereken word.

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

REMEMBER:

- Always give the formula (computational formula) for the computation asked; in most cases you will receive a mark for it.
- Round your final answer off to the second decimal space after the comma.
- Read the questions carefully.
- Do computations with the variables asked. You will not receive any marks if you do the computations correctly but with the wrong variables.
- Do not round off values from the tables.

ONTHOU:

- *Gee altyd die formule (berekeningsformule) vir die berekening wat gevra word; jy kry gewoonlik 'n punt daarvoor.*
- *Rond jou finale antwoord af tot die tweede plek na die komma.*
- *Lees die vrae noukeurig deur.*
- *Doen berekenings met die veranderlikes wat gevra word. Geen punte word toegeken indien jy die berekenings korrek doen met die verkeerde veranderlikes nie.*
- *Moenie waardes uit die tabelle afrond nie.*

QUESTION 1 / VRAAG 1

[8]

- | | | |
|--|---|-----|
| 1.1 $p(\text{Lerato})$ | $= 20/350$
$= 0,0571$
$= 0,06$ | (2) |
| 1.2 $p(\text{Lerato})$ | $= 20/349$
$= 0,0573$
$= 0,06$ | (2) |
| 1.3 $p(\text{Tebogo}) \times p(\text{Lerato})$ | $= 15/350 \times 20/349$
$= 0,0428 \times 0,0573$
$= 0,0024$
$= 0,002$ | (4) |

$$\begin{aligned}
 p(\text{Lerato}) \times p(\text{Tebogo}) &= 20/350 \times 15/349 \\
 &= 0,0571 \times 0,0429 \\
 &= 0,0024 \\
 &= 0,002 \\
 \\
 p(\text{Tebogo and Lerato}) &= 0,002 + 0,002 \\
 &= 0,004
 \end{aligned}$$

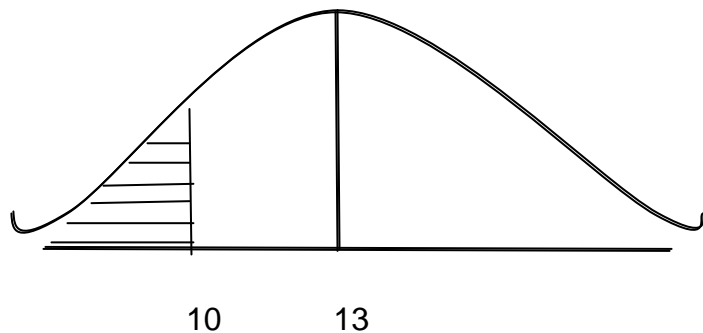
QUESTION 2 / VRAAG 2**[6]**

You collected information about the number of students who found the IOP2601 module valuable. You asked them to answer 5 questions on a 5-point scale. Given a normally distributed population with a mean (μ) of 13, a standard deviation (σ) of 3 and 50 as the number of cases (N), answer the following questions:

Jy samel inligting in oor die aantal studente wat die module IOP2601 van waarde vind. Jy vra die studente om 5 vrae volgens 'n 5-puntskaal te beantwoord. Jy werk met 'n normaal verspreide populاسie met 'n gemiddeld (μ) van 13, 'n standaardafwyking (σ) van 3 en 'n aantal gevalle (N) van 50. Beantwoord die volgende vrae:

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

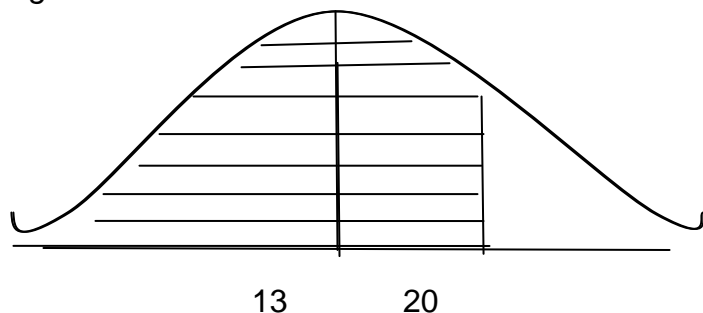
$$\begin{aligned}
 z &= \frac{X - \mu}{\sigma} \\
 &= \frac{10 - 13}{3} \\
 &= \frac{-3}{3} \\
 &= -1
 \end{aligned}$$



Proportion / *Proporsie* = **0,15866** (do not round off / *moenie afrond nie*)

- 2.2 What is the **percentage** of students with a raw score of less than 20? / *Wat is die **persentasie** studente met 'n telling van minder as 20?* (2)

$$\begin{aligned}
 z &= \frac{X - \mu}{\sigma} \\
 &= \frac{20 - 13}{3} \\
 &= \frac{7}{3} \\
 &= 2,33
 \end{aligned}$$



Proportion / Proporsie = **0,99010**

Percentage / Persentasie = **99,01%**

2.3 What is the **number** of students with raw scores between 10 and 20? / *Wat is die aantal studente met 'n routelling tussen 10 en 20?* (2)

X = 10: Mean to Z (-1) score = 0,34134

X = 14 : Mean to Z (2,33) score = 0,49010

Total = **0,83144**

OR / OF

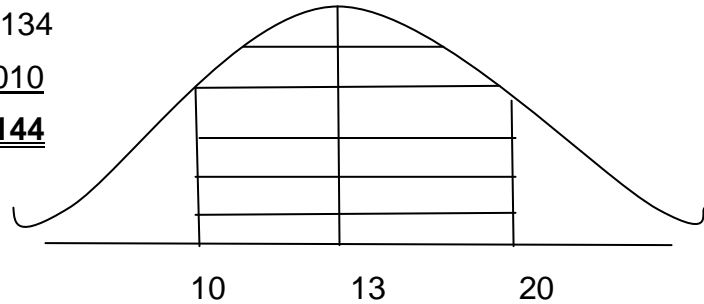
1 - (0,15866 + 0,00990)

1 - (0,16856)

Total / Totaal = **0,83144**

0,83144 x 50 students / *studente* = 41,572

= **42 students / studente** (round off / *rond af*)



QUESTION 3 / VRAAG 3

[4]

3.1 Null hypothesis: Students who have a positive attitude towards research do not perform better in their examination for IOP2601 in comparison to students who have a negative attitude towards research.

OR

There is no difference in the performance of students who have a positive attitude towards research in comparison to students who have a negative attitude towards research in their IOP2601 examination.

OR

Students who have a positive attitude towards research and students who have a negative attitude towards research perform equally well in their IOP2601 examination.

Alternative hypothesis: Students who have a positive attitude towards research do perform better in their examination for IOP2601 in comparison to students who have a negative attitude towards research.

Nulhipotese: Studente wat 'n positiewe houding teenoor navorsing het, presteer nie beter in hulle IOP2601-eksamen as studente wat 'n negatiewe houding teenoor navorsing het nie.

OF

Daar is geen verskil in die prestasie van studente met 'n positiewe houding teenoor navorsing en studente met 'n negatiewe houding teenoor navorsing in hulle IOP2601-eksamen nie.

OF

Studente met 'n positiewe houding teenoor navorsing en studente met 'n negatiewe houding teenoor navorsing presteer ewe goed in hulle IOP2601-eksamen.

Alternatiewe hipotese: Studente wat 'n positiewe houding teenoor navorsing het, presteer beter in hulle IOP2601-eksamen as studente wat 'n negatiewe houding teenoor navorsing het. (2)

3.2 $H_0 = \mu_{\text{positive / positief}} = \mu_{\text{negative / negatief}}$
OR/OF

$H_0 = \mu_{\text{positive / positief}} - \mu_{\text{negative / negatief}} = 0$

$H_1 = \mu_{\text{positive / positief}} > \mu_{\text{negative / negatief}}$ (2)

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

3.4 The students with a positive attitude towards research **perform better** than students who have a negative attitude. This can be said with **99% certainty**.

*Studente met 'n positiewe houding teenoor navorsing **presteer beter** as studente met 'n negatiewe houding. Dit kan met **99% sekerheid** gesê word.* (2)

QUESTION 4 / VRAAG 4

[10]

Data

Males	X^2_{males}	Females	X^2_{females}
8	64	3	9
8	64	2	4
8	64	5	25
4	16	1	1
4	16	1	1
5	25	4	16
5	25	4	16
7	49	7	49
1	1	7	49
1	1	8	64
$\Sigma X = 51$ $\bar{X}_1 = 5,1$ $s^2 = 7,21$ $N_1 = 10$	$\Sigma X^2 = 325$	$\Sigma X = 42$ $\bar{X}_2 = 4,2$ $s^2 = 6,40$ $N_2 = 10$	$\Sigma X^2 = 234$

$$s^2_{\text{Males}} = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1}$$

$$s^2_{\text{Males}} = \frac{325 - \frac{(51)^2}{10}}{10-1}$$

$$s^2_{\text{Males}} = 7,21$$

$$s^2_{\text{Females}} = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1}$$

$$s^2_{\text{Females}} = \frac{234 - \frac{(42)^2}{10}}{10-1}$$

$$s^2_{\text{Females}} = 6,4$$

4.1 $H_0 : \mu_{\text{Males}} = \mu_{\text{Females}}$ (1)

4.2 $H_1 : \mu_{\text{Males}} \neq \mu_{\text{Females}}$ (1)

4.3

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}} \quad (1)$$

$$= \frac{5,1 - 4,2}{\sqrt{\frac{7,21}{10} + \frac{6,40}{10}}} \quad (1)$$

$$= \frac{0.9}{\sqrt{0,721 + 0,64}}$$

$$= \frac{0,9}{\sqrt{1,361}}$$

$$= \frac{0,9}{1,1666}$$

$$= 0,77 \quad (1)$$

$$4.4 \quad df = N_1 + N_2 - 2$$

$$= 10 + 10 - 2$$

$$= 18 \quad (1)$$

$$4.5 \quad t_{0,05} (18) \text{ two-tailed} = 2,1009 \quad (1)$$

$$4.6 \quad 0,77 < 2,1009$$

\therefore Do not reject H_0 / Moenie H_0 verwerp nie (1)

4.7 There **is no significant difference** between males and females and their preferences for open distance learning. This can be said **with 95% certainty**.

*Daar is **nie** 'n betekenisvolle verskil tussen mans en vroue en hul voorkeure vir ope afstandsonderrig nie. Dit kan **met 95% sekerheid** gesê word.* (2)

QUESTION 5 / VRAAG 5

[12]

Data

X_1	X_2	X_3	X^2_1	X^2_2	X^2_3
10	4	2	100	16	4
10	4	2	100	16	4
10	4	1	100	16	1
10	3	3	100	9	9
5	5	2	25	25	2
$\Sigma X_1 = 45$	$\Sigma X_2 = 20$	$\Sigma X_3 = 10$	$\Sigma X^2_1 = 425$	$\Sigma X^2_2 = 82$	$\Sigma X^2_3 = 20$
$\bar{X}_1 = 9$	$\bar{X}_2 = 4$	$\bar{X}_3 = 2$			
Total $\Sigma X = 45 + 20 + 10 = 75$ $\Sigma X^2 = 425 + 82 + 20 = 527$ $\bar{X} = (9 + 4 + 2) / 3 = 5,0$					

$$\begin{aligned}
 SS_{total} &= \sum X^2 - \frac{(\sum X)^2}{N} & df_{total} &= N - 1 \\
 &= 527 - \frac{(75)^2}{15} & &= 15 - 1 \\
 & & &= 14 \\
 &= 527 - \frac{5625}{15} \\
 &= 527 - 375 \\
 &= 152
 \end{aligned}$$

$$\begin{aligned}
 SS_{group} &= n \sum (\bar{X}_j - \bar{X}_{..})^2 & df_{group} &= k - 1 \\
 &= 5[(9 - 5)^2 + (4 - 5)^2 + (2 - 5)^2] & &= 3 - 1 \\
 &= 5[(4)^2 + (-1)^2 + (-3)^2] & &= 2 \\
 &= 5[(16) + (1) + (9)] \\
 &= 5[26] \\
 &= 130
 \end{aligned}$$

$$\begin{aligned}
 SS_{error} &= SS_{total} - SS_{group} & df_{error} &= k(n - 1) \\
 &= 152 - 130 & &= 3(5 - 1) \\
 &= 22 & &= 12
 \end{aligned}$$

$$\begin{aligned}
 MS_{group} &= SS_{group} / df_{group} \\
 &= 130 / 2 \\
 &= 65
 \end{aligned}$$

$$\begin{aligned}
 MS_{error} &= SS_{error} / df_{error} \\
 &= 22 / 12 \\
 &= 1,83
 \end{aligned}$$

$$\begin{aligned}
 F &= \frac{MS_{group}}{MS_{error}} \\
 &= \frac{65}{1,83} \\
 &= 35,519 \\
 &= 35,52
 \end{aligned}$$

5.1

Source / Bron	df	SS	MS	F
Groups / Groepe	2	130	65	35,52
Error / Fout	12	22	1,83	
Total / Totaal	14	152		

(8)

5.2 $F_{0,01} (2,12) = 6,93$ (2 = numerator / teller, 12 = denominator / noemer) (1)

$$35,52 > 6,93$$

5.3 \therefore Reject H_0 / Verwerp H_0 (1)

5.4 There **is a significant difference** in the desirability levels of the three groups of stakeholders with regard to the chocolate bar. This can be said **with 99% certainty**.

Daar is 'n betekenisvolle verskil in die wenslikheidsvlakke van die drie belangegroepes met betrekking tot die sjokoladestafie. Dit kan met 99% sekerheid gesê word. (2)

QUESTION 6 / VRAAG 6

[3]

6.1 Yes, reject the null hypothesis. / Ja, verwerp die nulhipotese. (1)

6.2 There is a significant difference between absenteeism at the three plants. This can be said with 99% certainty.

Daar is 'n beduidende verskil tussen die afwesigheidsvlakke by die drie aanlegte. Dit kan met 99% sekerheid gesê word. (2)

QUESTION 7 / VRAAG 7

Data

	A	B	Total
3rd year students / 3dejaarstudente	200 (221,05)	100 (78,95)	300
Honours students / Honneursstudente	500 (478,95)	150 (171,05)	650
Total / Totaal	700	250	950

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

$$E_{11} = \frac{300 \times 700}{950} = 221,05$$

$$E_{12} = \frac{300 \times 250}{950} = 78,95$$

$$E_{21} = \frac{650 \times 700}{950} = 478,95$$

$$E_{22} = \frac{650 \times 250}{950} = 171,05$$

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

$$= \frac{(200 - 221,05)^2}{221,05} + \frac{(100 - 78,95)^2}{78,95} + \frac{(500 - 478,95)^2}{478,95} + \frac{(150 - 171,05)^2}{171,05}$$

$$= \frac{(443,103)}{221,05} + \frac{(443,103)}{78,95} + \frac{(443,103)}{478,95} + \frac{(443,103)}{171,05}$$

$$= (2,005) + (5,612) + (0,925) + (2,59)$$

$$= 11,132$$

$$= 11,13$$

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

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

$$= 1$$

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

$$7.2 \quad 11,13 > 6,6349$$

$$\therefore \text{Reject } H_0 / \text{Verwerp } H_0 \quad (1)$$

7.3 There is a **significant difference** between third-year students' and honours students' confidence that they will get jobs once they have a degree. This can be said **with 99% certainty**.

*Daar is 'n beduidende verskil tussen derdejaarstudente en honeursstudente rakende hulle vertroue dat hulle werk sal kry nadat hulle graad gekry het. Dit kan met **99% sekerheid** gesê word.* (2)

3. EXAMINATION INFORMATION / EKSAMENINLIGTING

Refer to page 10 in Tutorial letter 101/3/2014 for information on the examination. You should work through the study guide thoroughly in preparation for the examination. Where reference is made to sections and pages in the textbook, you should summarise those sections and integrate them with the material in the study guide. In this way you should be able to focus on the study guide and your own summaries when you start your revision for the examination.

Raadpleeg bladsy 10 in Studiebrief 101/3/2014 vir inligting oor die eksamen. Werk deeglik deur die studiegids ter voorbereiding op die eksamen. Waar daar in die studiegids na afdelings en bladsye in die voorgeskrewe boek verwys word, moet jy daardie gedeeltes opsom en integreer met die studiemateriaal in die studiegids. Wanneer jy dan vir die eksamen voorberei, hoef jy slegs op die studiegids en jou eie opsommings te fokus.

This tutorial letter includes 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.

Hierdie studiebrief sluit 'n vorige eksamenvraestel in om jou 'n aanduiding te gee van die eksamenformaat en die tipe vrae wat jy kan verwag.

There are no multiple-choice questions in the examination, although section A consists of short questions. Some examples of questions that require calculations from the October/November 2013 examination appear in the appendix. Remember that formulae and tables are provided in the examination paper.

Daar is geen meervoudigekeusevrae in die eksamen nie, maar afdeling A bestaan uit kortvrae. 'n Paar voorbeelde van vrae wat berekenings vereis uit die Oktober/November 2013-eksamen verskyn in die bylae. Onthou dat formules en tabelle in die eksamenvraestel verskaf word.

The pass mark for the examination is 50 per cent. If you do not obtain 50 per cent, but are admitted to the supplementary examination, you can rewrite the examination in the next semester. If you fail the supplementary examination you will have to re-register for the module.

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

The examination covers the entire curriculum, that is, the whole study guide as well as the assignments. Like the assignments, the examination paper includes questions that test knowledge, insight and application.

Die eksamen dek die hele kurrikulum, dit wil sê die hele studiegids én die werkopdragte. Soos die werkopdragte, sluit die eksamenvraestel ook vrae in wat kennis, insig en toepassing toets.

4 APPENDIX: EXAMINATION PAPER / BYLAE: EKSAMENVRAESTEL

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 resources 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 between communication skills and number of calls? (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 ability of a telephone operator to handle calls successfully if his or her communication skills score is 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 was 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 for this module by asking them to answer 5 different questions according to a 5-point scale. 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 2 groups of 10 employees each randomly (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 6 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 is normally distributed, select an appropriate statistical test and calculate the test statistic. Show ALL calculations. (3)

$\bar{D} = 3,2$	$s_D = 2,18$
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- (d) Determine the degrees of freedom. (1)
- (e) Determine the critical value for a 2-tailed test for a significance level of 5% (0,05). (1)
- (f) Interpret the results in terms of the rejection or non-rejection of the null hypothesis. (1)
- (g) Interpret your rejection or non-rejection 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]

You are an industrial psychologist and 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 employees towards the organisation. You survey a few people in three different sectors (marketing, accounting and production) concerning their attitudes towards 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
$\bar{X} = 2,6$	$\bar{X} = 5,0$	$\bar{X} = 6,2$
Total mean		
$\bar{X} = 4,6$		
$\Sigma X = 69$		
$\Sigma X^2 = 397$		

In your report to management, you answer the following question: Is there a significant difference in attitude towards the organisation among employees working in different sectors of the organisation? 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 or not you should reject the null hypothesis at **a significance level of 0,05**. (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.

The table gives 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]**AFDELING 2****VRAAG 1****[18]**

'n Groot finansiële instelling het onlangs 'n nuwe telesentrum geopen om die meeste kliëntnavrae te hanteer. Voor die telesentrum geopen is, het die telefoonoperateurs intensiewe opleiding gekry om hulle kommunikasievaardighede te verbeter. As die mensehulpbronnebeampte van die instelling wil jy nou weet of hierdie opleiding enige uitwerking gehad het op die telefoonoperateurs se vermoë om inkomende oproepe te hanteer. Jy versamel die tellings van 'n kommunikasievaardighedsbeoordeling wat aan die einde van die opleiding gedoen is en die aantal oproepe wat binne 'n uur suksesvol beantwoord is. Toe jy die data ontleed, stel jy die volgende vas:

- Die verband tussen die kommunikasievaardighedsbeoordeling en die aantal oproepe wat suksesvol hanteer is, is **0,59**.

- Die gemiddelde van X (kommunikasievaardigheidsbeoordeling) is **17,7** en die gemiddelde van Y (aantal oproepe wat suksesvol hanteer is) is **32,4**.
- Die helling is **0,85**.

Gebruik die 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 tussen die kommunikasievaardigheidsbeoordeling en die aantal oproepe wat suksesvol hanteer is? (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 mensehulpbronedepartement voorlê, noem jy dat jy 'n sekere formule gebruik om telefoonoperateurs se vermoë om oproepe suksesvol te hanteer, voorspel op grond van hulle kommunikasievaardigheidsbeoordeling.

- (d) Wat is die waarde van die afsnit? (2)
- (e) Bereken 'n telefoonoperateur se vermoë om oproepe suksesvol te hanteer as sy of haar kommunikasievaardigheidsbeoordeling 15 is. (1)
- (f) Gee 'n grafiese voorstelling van die regressielyn deur onderskeidelik die afsnit en die voorspelde waarde van die telefoonoperateur met 'n kommunikasievaardigheidsbeoordeling van 15 daarop aan te dui. (5)

Die telefoonoperateurs het 'n vraelys voltooi om hul persepsie te meet van die doeltreffendheid van die kommunikasievaardigheidsopleiding. Die minimumtelling wat hulle kon kry, was 45 (wat aandui dat die program glad nie effektief is nie) en die maksimumtelling was 80 (wat aandui dat die program baie effektief is). Gebruik die frekwensieverspreidings tabel hier onder 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 telefoonoperateurs wat onder 'n telling van hoë doeltreffendheid 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 samel inligting in oor hoeveel jou medestudente myUnisa in hierdie module gebruik het. U vra studente om 5 vrae volgens 'n 5-puntskaal 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** 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 uitwerking op die werkverrigting van werknemers in jou organisasie sal hê. Om dit te bepaal, het jy 2 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 plek in die hiërargie van die organisasie.

Die winsdelingskema is slegs vir groep A-werknemers geïmplementeer en NIE vir groep B-werknemers nie. Na 6 maande meet jy die werkverrigting van die werknemers in groep A en groep B.

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 besluit op 'n beduidendheidsvlak van $\alpha = 0,05$.

- (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 berekenings. (3)

$\bar{D} = 3,2$	$s_D = 2,18$
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- (d) Bepaal die vryheidsgraad. (1)
- (e) Bepaal die kritieke waarde vir 'n 2-kantige toets vir 'n 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. Namate die studie vorder, raak jy geïnteresseerd in die invloed daarvan om in verskillende sektore van die organisasie te werk op die houding van die werknemers teenoor die organisasie. Jy ondervra 'n paar mense in drie verskillende sektore (bemaking, rekeningkunde en produksie) oor hulle houding teenoor die organisasie. Die resultate verskyn in die tabel hier onder: ('n Hoër telling dui op 'n meer positiewe houding.)

BEMARKING	REKENINGKUND	PRODUKSIE
	E	
2	6	3
4	4	5
1	7	6
1	3	8
5	5	9
$\bar{X} = 2,6$	$\bar{X} = 5,0$	$\bar{X} = 6,2$
Totale gemiddelde		
$\bar{X} = 4,6$		
$\Sigma X = 69$		
$\Sigma X^2 = 397$		

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

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

- (a) Kies 'n gepaste statistiese toets om hierdie hipotese te toets en bereken die toetsstatistiek. Skryf jou antwoorde in 'n opsommingstabel. (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 bedryf saam te smelt. Bestuur is bekommerd oor werknemers se reaksie, en vra die bestuur en lynwerkers se menings oor die samesmelting.

Die tabel hier onder bevat die antwoorde van die twee groepe op die vraag: Ondersteun jy die samesmelting?

	JA	NEE
Bestuur	12	8
Lynwerkers	7	9

Die chi-kwadraatwaarde is 0,94.

- (a) Bepaal die kritiese waarde vir 'n beduidendheidsvlak 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)

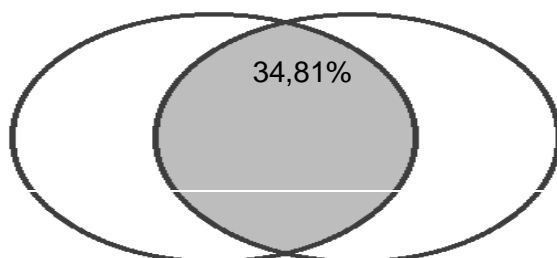
TOTAAL AFDELING 2: [50]

EXAMINATION PAPER MEMORANDUM / EKSAMENVRAESTEL MEMORANDUM

SECTION 2

QUESTION 1

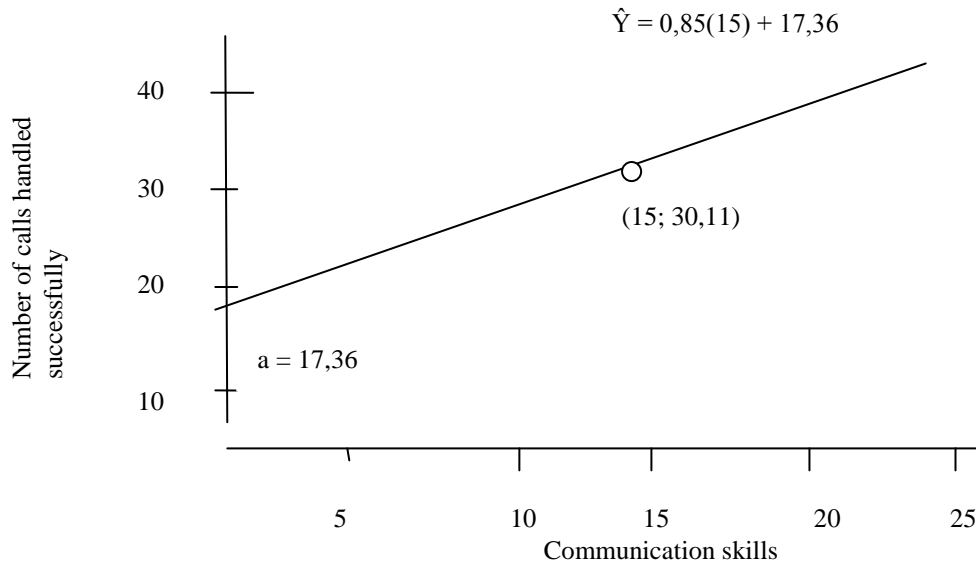
- (a) 0,59 moderate positive relationship (2)
- (b) Deduction: The better the telephone operators' communication skills, the better the number of calls handled successfully. (1)
- (c) Common variance: $r = 0,59$
 $r^2 = 0,3481 \times 100\%$
 $r^2 = 34,81\%$ (2)



- (d) Intercept: $a = \bar{Y} - b\bar{X}$
 $= 32,4 - (0,85) (17,7)$
 $= 32,4 - 15,045$
 $= 17,355$
 $= 17,36$ (2)

(e) Regression : $\hat{Y} = bX + a$
 $= (0,85)15 + 17,36$
 $= \mathbf{30,11}$ (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)

$$\text{Percentile rank} = \% \text{ below} + \frac{\text{score} - \text{RLL}}{\text{class int. width}} (\text{interval } \%)$$

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

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

$$= 63 + 19,249$$

$$= \mathbf{82,25}$$

(h) 55th percentile

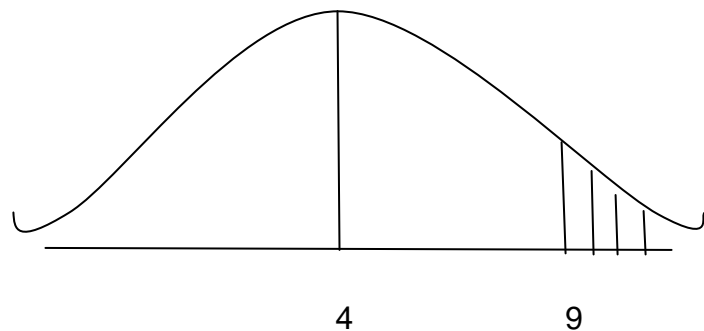
$$\begin{aligned}
 \text{Score of } p &= \text{RLL} + \frac{\text{PR} - \% \text{ below}}{\text{interval \%}} (\text{interval width}) \\
 (2) & \\
 &= 56,5 + \frac{55 - 40}{23} (6) \\
 &= 56,5 + \frac{15}{23} (6) \\
 &= 56,5 + 0,652 (6) \\
 &= 56,5 + 3,912 \\
 &= \mathbf{60,41}
 \end{aligned}$$

QUESTION 2**[6]**

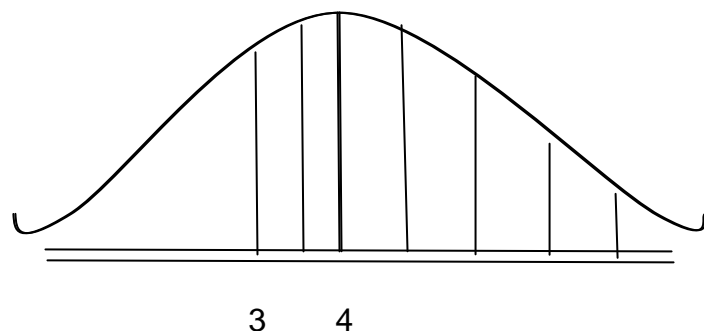
You collected information from your fellow students on how much they have used myUnisa in this module by asking them to answer 5 different questions according to a 5-point scale. Given a normally distributed population with a mean (μ) of 4, a standard deviation (σ) of 2, and 10 as the number of cases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

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

$$\begin{aligned}
 z &= \frac{X - \mu}{\sigma} \\
 &= \frac{9 - 4}{2} \\
 &= \frac{5}{2} \\
 &= \mathbf{2,5}
 \end{aligned}$$

Proportion / Proporsie = **0,00621**(b) What is the **percentage** of students with a raw score larger than 3? (2)

$$\begin{aligned}
 z &= \frac{X - \mu}{\sigma} \\
 &= \frac{3 - 4}{2} \\
 &= \frac{-1}{2} \\
 &= \mathbf{-0,5}
 \end{aligned}$$



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

Percentage = 69,15%

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

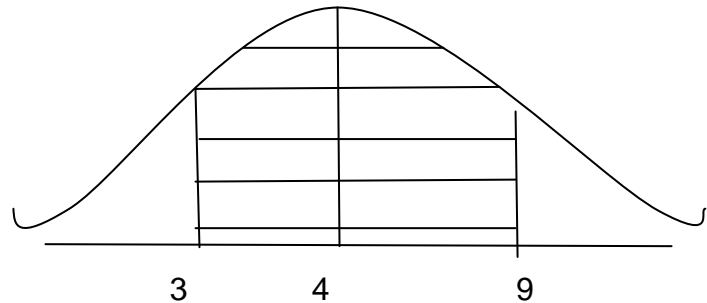
X = 9: Mean to Z score = 0,49379

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	D ²
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
		$\bar{D} = 3,2$ $S_D = 2,18$	

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

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

c)

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

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

$$= \frac{3,2}{\frac{2,18}{3,162}}$$

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

$$= \mathbf{4,64} \quad (1)$$

$$d) \quad df = N - 1$$

$$= 10 - 1$$

$$= 9 \quad (1)$$

$$e) \quad t_{0,05} (9) = 2,2622 \quad (1)$$

$$f) \quad 4,64 > 2,2622$$

\therefore *Reject / Verwerp H_0* (1)

g) It can be concluded with **95% certainty** that there **is a significant difference between** the job performance of group A and the job performance of group B. (2)

*Daar is 'n **statisties beduidende verskil** tussen die werkprestasie van groep A en dié van groep B. Dit kan met **95% sekerheid** gesê word.*

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
$\Sigma X_1 = 13$	$\Sigma X_2 = 25$	$\Sigma X_3 = 31$	$\Sigma X^2_1 = 47$	$\Sigma X^2_2 = 135$	$\Sigma X^2_3 = 215$
$\bar{X} = 2,6$	$\bar{X} = 5,0$	$\bar{X} = 6,2$			
Total $\Sigma X = 13 + 25 + 31 = 69$ $\Sigma X^2 = 47 + 135 + 215 = 397$ $\bar{X} = 4,6$					

$$\begin{aligned}
 SS_{total} &= \Sigma X^2 - \frac{(\Sigma X)^2}{N} & df &= N - 1 \\
 &= 397 - \frac{(69)^2}{15} & &= 15 - 1 \\
 & & &= 14 \\
 &= 397 - \frac{4761}{15} \\
 &= 397 - 317,4 \\
 &= 79,6
 \end{aligned}$$

$$\begin{aligned}
 SS_{group} &= n \Sigma (\bar{X}_j - \bar{X}_{..})^2 & df &= k - 1 \\
 &= 5[(2,6 - 4,60)^2 + (5,0 - 4,60)^2 + (6,2 - 4,60)^2] & &= 3 - 1 \\
 &= 5 [(-2,0)^2 + (0,40)^2 + (1,60)^2] & &= 2 \\
 &= 5 [(4,0) + (0,16) + (2,56)] \\
 &= 5 [6,72] \\
 &= 33,6
 \end{aligned}$$

$$\begin{aligned}
 SS_{error} &= SS_{total} - SS_{group} & df &= k(n - 1) \\
 &= 79,6 - 33,6 & &= 3(5 - 1) \\
 &= 46 & &= 12
 \end{aligned}$$

$$\begin{aligned}
 MS_{group} &= SS_{group} / df_{group} \\
 &= 33,6 / 2 \\
 &= 16,80
 \end{aligned}$$

$$\begin{aligned}
 MS_{error} &= SS_{error} / df_{error} \\
 &= 46 / 12 \\
 &= 3,83
 \end{aligned}$$

$$\begin{aligned}
 F &= \frac{MS_{group}}{MS_{error}} \\
 &= \frac{16,80}{3,83} \\
 &= 4,386
 \end{aligned}$$

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

(8)

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

(1)

$$4,39 > 3,89$$

∴ Reject / Verwerp

(1)

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

*Daar is 'n **statisties beduidende verskil** in werknemers wat in die verskillende sektore werk se houdings teenoor die organisasie. Dit kan met **95% sekerheid** gesê word.*

(2)

QUESTION 5**[4]**

$$\begin{aligned}
 \text{a) } df &= (R - 1)(C - 1) \\
 &= (2 - 1)(2 - 1) \\
 &= 1 \\
 \chi^2_{0.01}(1) &= 6,6349 \qquad (1)
 \end{aligned}$$

$$\text{b) } 0,94 < 6,6349$$

∴ Do not reject / Moenie verwerp nie (1)

There are **no significant differences** between the opinions of management and line workers regarding the merger. This can be said **with 99% certainty**.

Daar is geen statisties beduidende verskil tussen die opinies van bestuur en dié van lynwerkers met betrekking tot the samesmelting nie. Dit kan met 99% sekerheid gesê word. (2)

5 CONCLUSION / SLOT

Everything of the best with your preparation for the examination.
Sterkte met jou eksamenvoorbereiding.

Kind regards
Vriendelike groete

Your IOP2601 lecturers
Jou IOP2601-dosente

Ms Nomfusi Bekwa
 Prof Llewellyn van Zyl