NORTH-WEST UNIVERSITY
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Requirements for this paper/Benodigdhede vir hierdie vraestel:			
Answer scripts/ Antwoordskrifte:		Multi-choice cards (A5)/ Multikeusekaarte (A5):	X
Attendance slips (Fill-in paper)/ Presensiestrokies (Invulvraestel):		Multi-choice cards (A4)/ Multikeusekaarte (A4):	
Scrap paper/ Rofwerkpapier:	X	Graph paper/ Grafiekpapier:	

Calculators/Sakrekenaars: **Yes/Ja**

Other resources/Ander hulpmiddels:

Type of Assessment/ Tipe Assessering:	**Semester test 1 Semestertoets 1**	Qualification/ Kwalifikasie:	**B.Com**
Module code/ Modulekode:	**STTN122**	Duration/ Tydsduur:	**1½ hour 1½ uur**
Module description/ Module beskrywing:	**Introductory Statistics/ Inleidende Statistiek**	Max/ Maks:	**40**
Examiner(s)/ Eksaminator(e):	**RL Van Vught**	Date/ Datum:	**04/08/2018**
Internal/Interne Moderator(s):	**P Ntema**	Time/ Tyd:	**09:00**

Submission of answer scripts/Inhandiging van antwoordskrifte: **Ordinary/Gewoon**

Answer all questions on the multiple choice card.
Antwoord alle vrae op die multikeusekaart.

Question 1 **[2]**

Which of the following definitions is / are correct?

i. Statistical inference refers to the graphical and tabular methods used to summarize and order data.
ii. Measurements are valid if they lead to useful information concerning the property being studied.
iii. Statistical inference refers to methods used to draw conclusions about the population from sample data.
iv. Descriptive statistics refers to methods to collect data.
v. Measurement involves the process of assigning a numerical value to the property of an element.

1) All of the above
2) i, ii, iii
3) Only v
4) ii, iv
5) ii, iii, v

Vraag 1 ***[2]***

Watter van die volgende definisies is korrek?

i. Statistiese inferensie verwys na metodes om data te rangskik, grafies voor te stel en op te som.
ii. Metings is geldig indien dit tot bruikbare inligting aangaande die eienskap van belang lei.
iii. Statistiese inferensie verwys na metodes om gevolgtrekkings oor die populasie uit steekproefdata te maak.
iv. Beskrywende statistiek verwys na metodes om data in te samel.
v. Meting behels die proses van toekenning van 'n getal ten einde 'n eienskap van 'n waargenome item weer te gee.

1) Al die bogenoemde
2) i, ii, iii
3) Slegs v
4) ii, iv
5) ii, iii, v

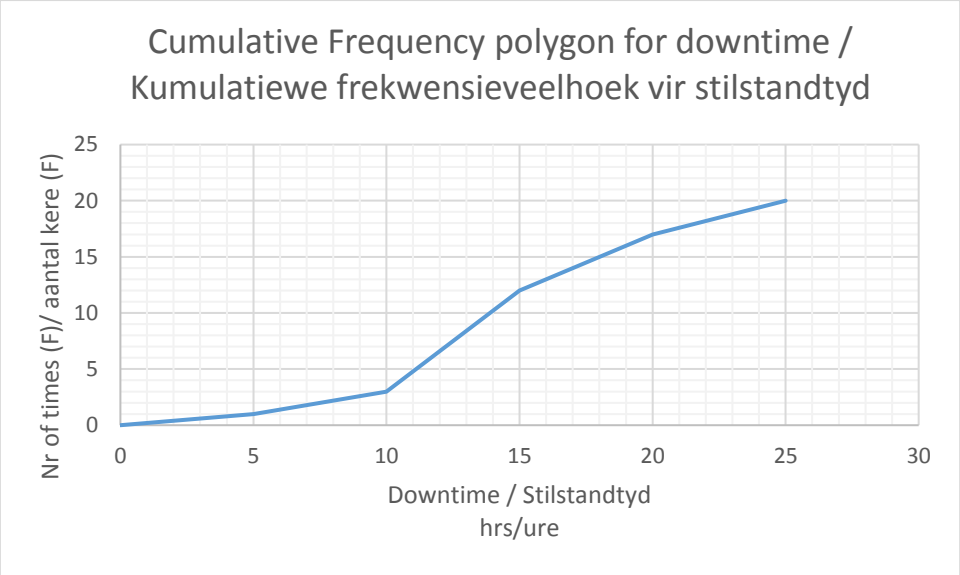
Question 2 **[2]** Consider the following examples: i. The number of "likes" you get on Facebook per month. ii. Your monthly cellphone expenditure. iii. The speed at which an airplane flies. iv. The number of correct answers in a 100 mark multiple choice question paper. v. The number of 500ml cooldrinks in a fridge. In which of the above cases is the variable mentioned, discrete in nature? 1) i, ii, iii 2) ii, iii, v 3) i, ii, iv 4) i, iv, v 5) None of the above.	***Vraag 2*** ***[2]*** *Beskou die volgende voorbeelde:* *i. Die aantal "likes" wat jy per maand op Facebook kry.* *ii. Jou maandelikse selfoon-uitgawes.* *iii. Die spoed waarteen 'n vliegtuig vlieg.* *iv. Die aantal korrekte antwoorde in 'n 100 punt multi-keuse vraestel.* *v. Die aantal 500ml koeldranke in 'n yskas.* *In watter van die bogenoemde gevalle is die veranderlike ter sprake, diskreet van aard?* *1) i, ii, iii* *2) ii, iii, v* *3) i, ii, iv* *4) i, iv, v* *5) Geen van die bogenoemde.*
Question 3 **[2]** Which of the following is an example of a variable measured on a interval scale? 1) Marital status of a person 2) The number of people in a bus. 3) A person's attitude towards their job is classified as "poor", "average"or "good". 4) The time of day that an employee leaves from work to home. 5) Subjects that you took at school.	***Vraag 3*** ***[2]*** *Watter van die volgende is 'n voorbeeld van 'n veranderlike wat op 'n intervalskaal gemeet word?* *1) Huwelikstatus van 'n persoon.* *2) Die aantal mense in 'n bus.* *3) 'n Persoon se gesindheid teenoor hulle werk word geklassifiseer as "swak", "gemiddeld"of "goed".* *4) Die tyd van die dag waarop 'n werknemer vanaf die werk huistoe gaan.* *5) Vakke wat jy op skool geneem het.*
Use the following information to answer **Questions 4,5 & 6.** A statistician is interested in the average number of energy drinks that students in South Africa drink per day. He draws a sample by randomly selecting four South African universities, and his sample consists of 350 randomly selected students from each university. 300 of the students replied that they have only one drink a day.	*Gebruik die volgende inligting om **Vrae 4, 5 & 6** te beantwoord.* *'n Statistikus stel belang in die gemiddelde aantal energie drankies wat studente in Suid-Afrika per dag drink. Hy trek 'n steekproef deur op 'n ewekansige wyse vier Suid-Afrikaanse universiteite te kies, en sy steekproef bestaan uit 350 ewekansig gekose studente vanuit elke universiteit.*
Question 4 **[2]** Identify the population for this research. 1) All the students from all 4 universities. 2) All the students in the world. 3) All students in South Africa 4) 350 students 5) 650 students	***Vraag 4*** ***[2]*** *Identifiseer die populasie vir die navorsing.* *1) Al die studente van al 4 universiteite.* *2) Al die studente in die wêreld.* *3) Al die studente in Suid-Afrika* *4) 350 studente* *5) 650 studente*
Question 5 **[2]** Identify the total sample size. 1) n = 4 2) n = 300 3) n = 350 4) n = 650 5) n = 1400	***Vraag 5*** ***[2]*** *Identifiseer die steekproefgrootte in totaal.* *1) n = 4* *2) n = 300* *3) n = 350* *4) n = 650* *5) n = 1400*

Question 6 [2] Which type of sampling did he use? 1) Cluster sampling 2) Convenient sampling 3) Stratified sampling 4) Simple random sampling 5) Non-probability sampling	***Vraag 6 [2]*** *Watter tipe steekproefneming het hy gebruik?* *1) Trossteekproefneming* *2) Geriefsteekproefneming* *3) Gestratifiseerde steekproefneming* *4) Eenvoudige ewekansige steekproefneming* *5) Nie-waarskynlikheidsteekproefneming*
Question 7 [2] A simple random sample of 25 people is drawn from a poulation of 653 people, without replacement. Use the following random numbers to select the sixth (6^{th}) person that should be included in the sample. Start at the first number and read from left to right. 98152654785152691552288596623194 48645269632819237356552965982325 1) 598 2) 231 3) 232 4) 526 5) 296	***Vraag 7 [2]*** *'n Eenvoudige ewekansige steekproef van 25 word sonder terugplasing uit 'n populasie van 653 mense getrek. Gebruik die volgende kanssyfers om die sesde (6de) persoon wat in die steekproef ingesluit moet word, te kies. Begin by die eerste getal en lees van links na regs.* *98152654785152691552288596623194* *48645269632819237356552965982325* *1) 598* *2) 231* *3) 232* *4) 526* *5) 296*
Question 8 [2] A researcher wants to determine the number of employees of a certain company that predicts that South Africa will win the 2022 soccer world cup. There are 730 people working at the company, of which 482 are male. The researcher draws a stratified random sample of size 80 from the employees. The gender of the employees is used as strata. Calculate the number of women that should be included in the sample. 1) 27.18 2) 27 3) 52.82 4) 53 5) 248	***Vraag 8 [2]*** *'n Navorser wil die aantal werknemers by 'n sekere maatskappy bepaal wat voorspel dat Suid-Afrika die 2022 sokkerwêreldbeker sal wen. Die maatskappy het 730 werknemers, waarvan 482 mans is. Die navorser trek 'n ewekansige gestratifiseerde steekproef van grootte 80 uit die werknemers. Die geslag van die werknemers word as strata gebruik.* *Bereken die aantal dames wat in die steekproef ingesluit moet word.* *1) 27.18* *2) 27* *3) 52.82* *4) 53* *5) 248*
Use the following information to answer **Questions 9 to 13**. The time in seconds it took some athletes at a certain school to complete the 800m race was recorded. The results of the sample are summarized in the following cumulative frequency table:	Gebruik die volgende inligting om **Vrae 9 tot 13** te beantwoord. *Die tyd wat dit sommige atlete by 'n sekere skool geneem het om die 800m wedloop te voltooi, is opgeteken. Die resultate van die steekproef word in die volgende kumulatiewe frekwensietabel opgesom:*

Time / *Tyd* (in seconds/*in sekondes*)	Cumulative frequency / *Kumulatiewe frekwensie* F
<125	0
<150	3
<175	7
<200	11
<225	16
<250	17
<275	18
<300	x

Question 9 [2] Calculate the range. 1) 150 2) 175 3) 137.5 4) 25 5) None of the above.	***Vraag 9 [2]*** *Bereken die variasiewydte.* *1) 150* *2) 175* *3) 137.5* *4) 25* *5) Geen van die bogenoemde.*
Question 10 [2] It is known that the cumulative relative frequency associated with the boundary <200 is 0.500. Determine the value of x. 1) 18 2) 20 3) 22 4) 25 5) 30	***Vraag 10 [2]*** *Dit is bekend dat die kumulatiewe relatiewe frekwensie wat met die klasgrens <200 geassosieer word, 0.500 is. Bepaal die waarde van x.* *1) 18* *2) 20* *3) 22* *4) 25* *5) 30*
Question 11 [2] Determine the class midpoint associated with the class [250;275). 1) 262 2) 262.5 3) 263 4) 263.5 5) 25	***Vraag 11 [2]*** *Bepaal die klasmiddelwaarde wat met die klas [250;275) geassosieer word.* *1) 262* *2) 262.5* *3) 263* *4) 263.5* *5) 25*
Question 12 [2] Determine the relative frequency associated with the class [200;225). 1) 0.250 2) 0.278 3) 0.200 4) 0.227 5) None of the above.	***Vraag 12 [2]*** *Bepaal die relatiewe frekwensie wat met die klas [200;225) geassosieer word.* *1) 0.250* *2) 0.278* *3) 0.200* *4) 0.227* *5) Geen van die bogenoemde.*

Question 13 [2]	***Vraag 13*** *[2]*
How many athletes took less than two and a half (2½) minutes to complete the race. 1) 1 2) 2 3) 3 4) 4 5) 5	*Hoeveel atlete het minder as twee en 'n half* (2½) *minute geneem om die wedloop te voltooi.* *1) 1* *2) 2* *3) 3* *4) 4* *5) 5*
Use the following information to answer **Questions 14 to 16**. A production company wants to investigate the number of hours of downtime (per week) they experienced due to loadshedding. The results are summarized in the following cumulative frequency polygon.	*Gebruik die volgende inligting om **Vrae 14 tot 16** te beantwoord.* *'n Produksiemaatskappy wil die aantal ure ondersoek wat hulle tot stilstand was (per week), as gevolg van beurtkrag. Die resultate word in die volgende kumulatiewe frekwensieveelhoek opgesom:*



Question 14 [2]	***Vraag 14*** *[2]*
How many times did they experience a downtime between 10 and 20 hours? 1) 10 2) 12 3) 14 4) 17 5) 19	*Hoeveel keer het hulle 'n stilstandtyd tussen 10 en 20 ure ervaar?* *1) 10* *2) 12* *3) 14* *4) 17* *5) 19*
Question 15 [2]	***Vraag 15*** *[2]*
How much downtime did they experience for at least 80% of the times? 1) 3.5 2) 6 3) 10 4) 10.5 5) 19	*Hoeveel stilstandtyd het hulle vir ten minste 80% van die kere ervaar?* *1) 3.5* *2) 6* *3) 10* *4) 10.5* *5) 19*

Question 16 [2]	***Vraag 16*** *[2]*
What is the sample size of this dataset? 1) 25 2) 30 3) 35 4) 40 5) None of the above.	*Wat is die steekproefgrootte van die datastel?* *1) 25* *2) 30* *3) 35* *4) 40* *5) Geen van die bogenoemde.*
Use the following information to answer **Questions 17 to 20**. A researcher chooses a random sample of 50 households to in Vereeniging to determine how many dogs they keep. The results of the sample is summarized in the following frequency table.	*Gebruik die volgende inligting om **Vrae 17 tot 20** te beantwoord.* *'n Navorser kies 'n ewekansige steekproef van 50 huishoudings in Vereeniging om te bepaal hoeveel honde hulle aanhou. Die resultate van die steekproef is in die volgende frekwensietabel opgesom*

Dogs/*Honde*	**frequency / *frekwensie***
0	5
1	12
2	16
3	11
4	2
5	4
Total/*Totaal*	**50**

Question 17 [2]	***Vraag 17*** *[2]*
Calculate the cumulative frequency associated with 3 dogs. 1) 11 2) 22 3) 0.22 4) 44 5) None of the above.	*Bereken die kumulatiewe frekwensie wat met 3 honde geassosieer word.* 1) *11* 2) *22* 3) *0.22* 4) *44* 5) *Geen van die bogenoemde.*
Question 18 [2]	***Vraag 18*** *[2]*
What percentage of households in Vereeniging keeps less than 3 dogs? 1) 11 2) 33 3) 44 4) 55 5) 66	*Watter persentasie huishoudings in Vereeniging hou minder as 3 honde aan?* *1) 11* *2) 33* *3) 44* *4) 55* *5) 66*
Question 19 [2]	***Vraag 19*** *[2]*
What percentage of households in Vereeniging keeps no dogs? 1) 0 2) 0.1 3) 1 4) 5 5) 10	*Watter persentasie huishoudings in Vereeniging hou geen honde aan nie?* *1) 0* *2) 0.1* *3) 1* *4) 5* *5) 10*

Question 20 **[2]**	***Vraag 20*** ***[2]***
If a pie chart is constructed, determine the size of the angle associated with 5 dogs. 1) 4 2) 0.08 3) 25 4) 28.8 5) None of the above.	*Indien 'n sektorkaart geteken word, bereken die grootte van die hoek wat met 5 honde geassosieer word.* 1) *4* 2) *0.08* 3) *25* 4) *28.8* 5) *Geen van die bogenoemde.*

TOTAL/*TOTAAL* :40

Formulae/Formules

$\frac{N_i}{N} = \frac{n_i}{n}$	$k = 1 + 1.4\ln(n)$	$w = \frac{R}{k}$
$r = \frac{f}{n}$	$\bar{x} = \frac{\sum x}{n}$	$\bar{x} = \frac{\sum fx}{n}$
$\bar{x} = \frac{\sum fm}{n}$	$\tilde{x} = \left(\frac{n+1}{2}\right)$ th observation/*de waarneming*	$\tilde{x} = \left(\frac{n}{2}\right)$ th observation/*de waarneming*
$R = x_{max} - x_{min}$	$q_1 = \left(\frac{n+1}{4}\right)$ th observation/*de waarneming*	$q_1 = \left(\frac{n}{4}\right)$ th observation/*de waarneming*
R = upper boundary of largest class – lower boundary of smallest class *R = bogrens van grootsteklas – ondergrens van kleinsteklas*	$q_3 = \frac{3(n+1)}{4}$ th observation/*de waarneming*	$q_3 = \frac{3n}{4}$ th observation/*de waarneming*
$h^{th} + b \times \left((h+1)^{th} - h^{th}\right)$ $h^{de} + b \times \left((h+1)^{de} - h^{de}\right)$	$q_R = q_3 - q_1$	$q_d = \frac{q_3 - q_1}{2} = \frac{q_R}{2}$
$V = \frac{s}{\bar{x}} x100$	$s = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}}$	$s = \sqrt{\frac{\sum fx^2 - n\bar{x}^2}{n-1}}$
$s = \sqrt{\frac{\sum fm^2 - n\bar{x}^2}{n-1}}$	$r = \frac{s_{xy}}{s_x s_y}$	$S_{xy} = \frac{\sum xy - \frac{\sum x \sum y}{n}}{n-1}$
$\hat{y} = a + bx$	$b = \frac{\sum xy - \frac{1}{n}\sum x \sum y}{\sum x^2 - \frac{1}{n}(\sum x)^2}$	$b = \frac{\sum xy}{\sum x^2}$
$a = \bar{y} - b\bar{x}$	$Z = \frac{X - \mu}{\sigma}$	$Z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$
$a = \bar{y}$	$\frac{s}{\sqrt{n}}$	$\hat{P} = \frac{X}{n}$
$\sqrt{\frac{\hat{P}(1-\hat{P})}{n}}$	$\left[\bar{X} - z\left(\frac{\alpha}{2}\right)\frac{S}{\sqrt{n}} \; ; \; \bar{X} + z\left(\frac{\alpha}{2}\right)\frac{S}{\sqrt{n}}\right]$	$\left[\hat{P} - z\left(\frac{\alpha}{2}\right)\sqrt{\frac{\hat{P}(1-\hat{P})}{n}} ; \hat{P} + z\left(\frac{\alpha}{2}\right)\sqrt{\frac{\hat{P}(1-\hat{P})}{n}}\right]$
$Z = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$	$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$	$Z = \frac{\hat{P}_1 - \hat{P}_2}{\sqrt{\hat{P}(1-\hat{P})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$ with/*met* $\hat{P} = \frac{X_1 + X_2}{n_1 + n_2}$