SUPERVISOR'S USE ONLY

91037



Level 1 Mathematics and Statistics, 2018 91037 Demonstrate understanding of chance and data

9.30 a.m. Tuesday 20 November 2018 Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of chance and data.	Demonstrate understanding of chance and data, justifying statements and findings.	Demonstrate understanding of chance and data, showing statistical insight.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

ELECTRICITY





https://marttherev.wordpress.com/2011/09/05/pylons-i-have-known/

QUESTION ONE

(a) When the supply of electricity stops, there is a power outage.

The table below shows:

- the number of power outages during 2015 in the North Island together with the identified cause of each power outage
- the number of power outages during 2015 in the South Island together with the identified cause of each power outage.

		Ca	use		
	Weather	Animals	Vehicle accident	Other	Totals
North Island	18	5	14	7	44
South Island	10	2	3	5	20
Totals	28	7	17	12	64

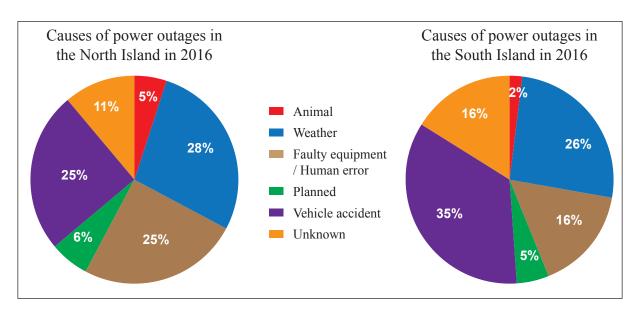
What was the probability that the weather caused a power outage in either the North Island or the South Island in 2015?
There was a power outage in the South Island in 2015.
What was the probability this was not caused by a vehicle accident?

b)		of homes on the national power supply in New Zealand are in the North Island. The rest in the South Island.	ASSESSO USE ON
	70%	of homes in the North Island and 80% of homes in the South Island use electricity for heating.	
	(i)	Calculate the probability that a home selected randomly across New Zealand is on the national power supply in the North Island AND uses electricity for heating.	
		Show your working clearly.	
	(ii)	There are 1500000 homes across New Zealand (both in the North Island and the South Island).	
		Calculate how many of the homes on the national power supply in the South Island do not use electricity for heating.	
		Show your working clearly.	

(c) The causes of power outages can also be shown graphically.

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For each island, there is a graph below showing the percentage of power outages in **2016** for each of the causes.



The pie graphs lead to a claim that, "In both the North Island and the South Island, vehicle accidents or weather are the cause of over half of the power outages".

Explain whether this claim will be true for every year.		
Justify your answer with statistical reasoning.		

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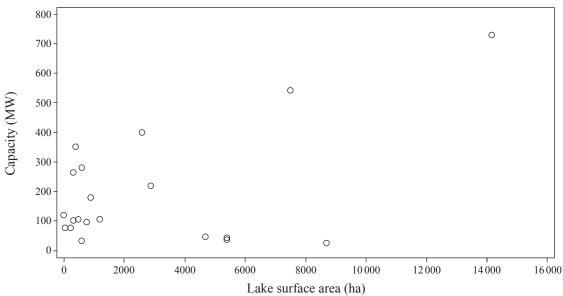
QUESTION TWO

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(a) Some lakes in New Zealand are used to produce electricity.

A sample of these lakes had their surface area in ha (hectares) and their capacity to generate electricity, measured in MW (megawatts), recorded and displayed below.





- (i) On the graph above, circle the **most appropriate** point which indicates a lake which produces a small amount of electricity but has a large surface area.
- (ii) State the approximate **median** amount of electricity (in MW) produced by these lakes in New Zealand.

Show how you reached your answer clearly.				

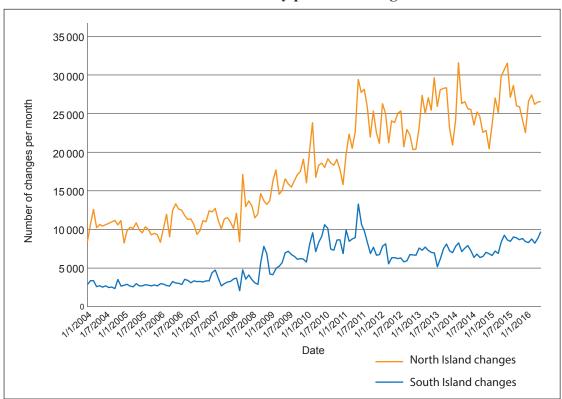
How useful is it to use the surface area of a lake to predict the potential electricity generation of lakes in New Zealand?	ASS
Justify your reasoning clearly.	
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(b) It is possible for electricity users to change electricity providers to get a cheaper deal.

The graph below shows the number of changes made by electricity users per month in the North Island and South Island from the start of 2004 to the start of 2016.

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Trends in electricity provider changes



(i)

to the North and	our islands	ii iieeessai y	•	

State whether the North Island or the South Island has the greatest variation in the number of changes per month? Give statistical reasons for your answer.			
number of changes per month?			
Give statistical reasons for your answer.	number of c	changes per month?	
	Give statisti	cai reasons for your answer.	

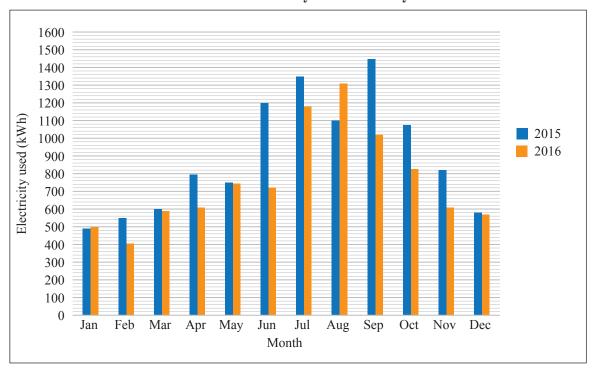
QUESTION THREE

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(a) Nicole's electricity provider created the graph below of her electricity use from January to December for 2015 and 2016.

The electricity used is measured in kilowatt hours (kWh).

Nicole's electricity use - monthly



(i)	Did Nicole tend to use less electricity in 2015 or 2016?
	Justify your answer with statistical reasoning.

(ii)	Approximately how much electricity (kWh) would you have expected Nicole to use in
	July 2017, based on her usage in the previous two years?

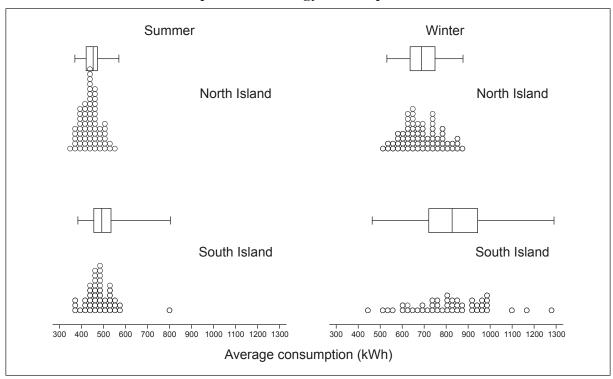
Justify your answer with statistical reasoning.

)	Comment on any other trends or features evident in this display of Nicole's electricity use.	ASSESS USE O
	Explain what may have caused these trends or features.	

(b) The graphs below show the average electricity consumption (in kWh) of a sample of electricity regions in the North Island compared to a sample of electricity regions in the South Island, in summer (December, January and February) and winter (June, July and August).

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Comparison of energy consumption



Justify your ans	wer with statist	tical reasoning	g.	

in the winter.		

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