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3

91584



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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

SUPERVISOR'S USE ONLY

Level 3 Mathematics and Statistics (Statistics), 2017

91584 Evaluate statistically based reports

9.30 a.m. Monday 27 November 2017
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Evaluate statistically based reports.	Evaluate statistically based reports, with justification.	Evaluate statistically based reports, with 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.

Pull out Resource Booklet 91584R from the centre of this booklet.

Show ALL working.

Make sure that you have the Formulae and Tables Booklet L3–STATF.

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

Check that this booklet has pages 2–8 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.

Achievement

TOTAL

10

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QUESTION ONE

Refer to **Report 1** in the resource booklet to answer the following questions.

- (a) Identify and describe the explanatory and response variables for this study.

Explanatory variable: classical music

Response variable: stress levels

- (b) The report states that "... dogs' stress levels decreased after listening to classical music".

Explain why each dog's stress levels were measured twice.

The dogs stress levels were measured twice so that the people at the Scottish SPCA and the University of Glasgow could end up getting a fair out out experiment. With both group of dogs getting their stress level measured with and without classical music

- (c) The report claims that "Classical music has a calming effect on dogs in rehoming centres".

- (i) In terms of the design of the study (specifically the order of the conditions), what else do you need to know before assessing this claim, and why?

- If the dog is male or female
- If the dog is in the correct group
- If the dog is or isn't deaf
- Make sure both groups hear the same song for the same amount of time
- check for heart problems

- (ii) A potential issue with a statistical study is extending the results inappropriately.

Discuss TWO potential issues with extending the results of this study to all dogs in rehoming centres.

1. if this study was to extend it could change the stress levels of the dog by the dog over hearing the music and getting annoyed as it might ~~the~~ start to have an effect on its daily routine with sleeping or even thinking as the music could start to distract them
2. some of the dogs ~~was~~ might not feel comfortable being surrounded by so many ~~other~~ ^{other dogs} when coming ~~out of~~ from being ~~rescued~~ ^{rescued} to being placed with other dogs in a new environment as their social skills with one another would be a new thing to them as they had been abandoned so could have trust issues or socialising issues

QUESTION TWO

Refer to **Report 2** in the resource booklet to answer the following questions.

- (a) The report states that 500 dog owners were surveyed.

- (i) Calculate the margin of error for this survey.

$$\frac{100}{\sqrt{500}} = 4.5\%$$

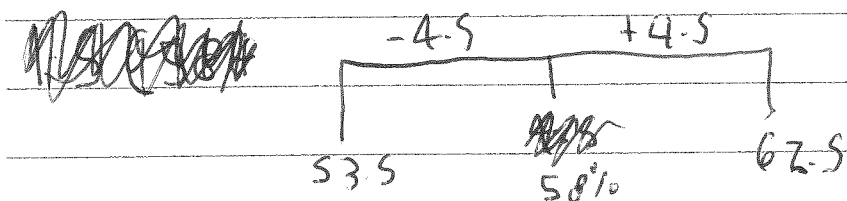
- (ii) Explain why the margin of error should be included in statistical survey reports.

as it gives us a clear percentage to represent the ~~survey~~ survey with so we understand what groups are larger / smaller between the two

- (b) Assume that the sample of New Zealand dog owners was representative of all New Zealand dog owners at the time of the survey.

Can a claim be made that over half of New Zealand dog owners have no idea what ingredients are in the food they feed their dog?

Using a relevant survey percentage provided in the report, construct a confidence interval, and interpret this interval as part of your answer.



Yes you can support the claim ~~that~~ that over half of New Zealand dog owners have no idea what ingredients are in the food they feed their dog as there is no 0 in the confident interval

(It ranges from 53.5% to 62.5% of NZ dog owners not knowing)

- (c) The report states that the K9 Natural survey "revealed that 40% of dogs suffer from an array of health conditions".

- (i) One component to consider when evaluating statistical survey reports is who funded the study.

Explain why there is a potential issue with who funded this survey.

It could be an issue as they could be trying to push their company name out within the report by ~~saying~~ lying and say that their company will improve your dogs health ect. This is when the experiment could be bias as they might not share all information if it was to hurt or look bad for their company

- (ii) Discuss ONE potential non-sampling error for this survey and how it could cause bias.

with people answering on a survey we don't know if they are telling the truth as no one is watching the dog owner feed their dog. So they could lie on the survey ~~make~~ monkey to make themselves look like they are feeding their dog the right food. Also when doing a survey you might not know if your dog is sick or if it suffers from a health condition so this can also cause bias as not all the information and the correct information was given

QUESTION THREE

Refer to **Report 3** in the resource booklet to answer the following questions.

- (a) The survey states that the margin of error for both the 1992 and 2012 surveys was 3.6%.
- (i) If 1000 New Zealanders had been surveyed, the reported margin of error would be 3.2%.

Was the number of New Zealanders surveyed in 1992 higher or lower than 1000?
Support your answer with statistical reasoning.

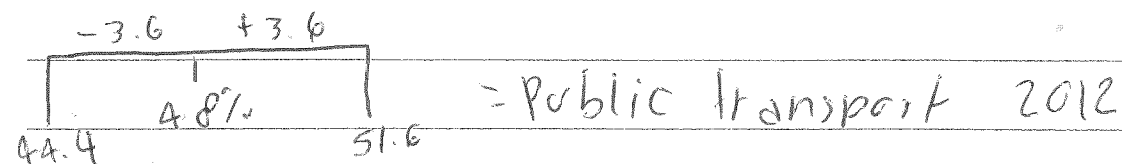
- (ii) Explain why it would be inappropriate to use the reported margin of error to construct an approximate 95% confidence interval for the percentage of New Zealanders in 1992 who supported spending on public transport.

as there were still 32% of the people
unsure/neither/both so you wouldn't
get an exact percentage to represent
the group

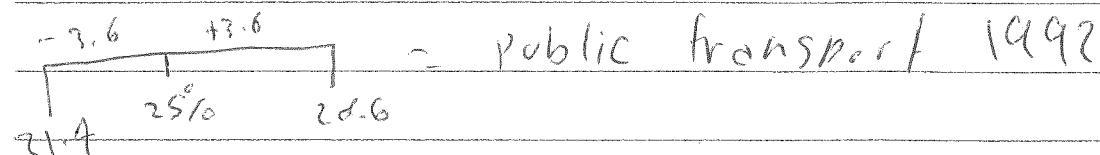
- (b) The report states that for the 2012 survey "those supporting priority spending on public transport had grown to 48 per cent, compared with 37 per cent favouring roads".

Could a claim be made that a higher percentage of New Zealanders in 2012 supported spending on public transport than spending on roads?

Construct ONE confidence interval, and interpret this interval as part of your answer.



= public transport 2012



= public transport 1992

As we can see from the CIs from 2012 and 1992 that the CI for 2012 is much higher than the 1992 with 2012

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ranging from 44.4% to 51.6% and the
1992 CI ranging from 21.4% to 28.6% this
is when we can accurately say that there is a
higher percentage of NZ people in 2012 supporting
spending money on public transport than roads

- (c) The headline for the report states "Poll shows preference for public transport over motorways and roads has doubled in 20 years".

Evaluate what statistical evidence, if any, has been presented in the report to support this headline.

both groups public transport and
neither/both/unsure doubled meaning
NZ people were finding it more convenient
for more public transport and less
cars on the road this is when we
see the world coming a long way since
1992 as its overall better for the
environment and up coming
generations

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Extra paper if required.
Write the question number(s) if applicable.

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QUESTION
NUMBER

91584

Achieved exemplar 2017

Subject:	Statistics	Standard:	91584	Total score:	10
Q	Grade score	Annotation			
1	A3	<p>1(a) Doesn't describe the explanatory and response variables with any reference to dogs</p> <p>1(b) Answer shows minimal understanding of paired comparison design</p> <p>1(c)(i) Identifies the conditions for the music being played would have to be the same (all other points are not about experiment design features)</p> <p>1(c)(ii) Misinterpreted "extending the results of this study"</p>			
2	A4	<p>2(a)(i) Correct margin of error</p> <p>2(a)(ii) Explanation does not clearly articulate understanding of sampling variability</p> <p>2(b) Confidence interval constructed but not correctly interpreted nor used to support claim (refers to 0 rather than 50 as not being in the confidence interval)</p> <p>2(c)(i) Doesn't identify who funded the survey</p> <p>2(c)(ii) Discusses self-reporting as a potential non-sampling error, linking to the statistical report (health conditions of dog). Doesn't clearly state how this could cause bias.</p>			
3	A3	<p>3(a)(ii) Doesn't identify 25% as the relevant survey percentage, nor answer the question.</p> <p>3(b) Constructs two separate confidence intervals, rather than the one asked for in the question. This limits the response to a "j". Correctly reasons with the confidence intervals in terms of supporting the claim.</p> <p>3(c) No survey percentages are used (statistical evidence) in the response.</p>			