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3

91584



NEW ZEALAND QUALIFICATIONS AUTHORITY  
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SUPERVISOR'S USE ONLY

## Level 3 Mathematics and Statistics (Statistics), 2015

### 91584 Evaluate statistically based reports

2.00 p.m. Thursday 19 November 2015  
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 2–11 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.**

**Not Achieved**

**TOTAL**

**6**

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## QUESTION ONE

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

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

explanatory variable is the colour of the car

response variable is the cars that ~~crash~~ crashed. //

- (b) (i) Explain whether this study is an observational study or an experiment.

~~this~~ this study is an observational study as the ~~the~~ results were simply recorded and unaltered. //

No clear explanation  
of observational study

- (ii) Give an implication of using the type of study identified in part (i) for the specific relationship investigated.

an implication could be where the crashes took place, if the place was some where specific in NZ or a particular road in NZ. //

No reference to causal  
claim cannot be made.

(c) For this study, the researchers collected sample data on the distribution of car colours for all cars on Auckland roads.

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(i) Explain why the researchers compared the percentage of colours for cars involved in crashes to the percentage of colours of cars on Auckland roads.

Auckland ~~is the~~ has the largest population in New Zealand, meaning more cars on roads than any where else in New Zealand.

HS

No explanation to why a comparison is made.

(ii) The researchers used cluster sampling to obtain their sample.

Discuss ONE example of how clusters may have been determined to ensure a representative sample.

- (d) The report states that researchers found “a significant reduction in the risk of serious injury in silver cars compared with white cars” and that “factors that could affect the results were taken into account in the analysis.”

A potential issue with a statistical study is extending the results inappropriately.

Discuss ONE potential issue with extending the results of this study to all cars on New Zealand roads in 1998 – 1999.

an issue could be //

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## QUESTION TWO

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

For parts (a) – (d), assume that the sample obtained is representative of all New Zealand drivers.

- (a) The report states that “59% of the survey respondents rated changing the radio/iPod/MP3 player while driving as distracting.”

Construct a confidence interval using this survey percentage and interpret this confidence interval.

$$\begin{aligned} \text{MoE} &= \frac{1}{\sqrt{n}} \times 100 \\ &= \frac{1}{\sqrt{1000}} \times 100 \\ &= 3.162\% \end{aligned}$$

$$\begin{aligned} \text{CI} &= 3.162 + 59 = 62.162\% \\ &= 3.162 - 59 = -55.838\% \\ &[-55.838\% - 62.162\%] // \end{aligned}$$

Incorrect CI calculation  
for lower end being  
negative.

- (b) The report states that 20% of survey respondents had sent texts while driving.

Discuss ONE potential issue with a survey question that asks respondents for this particular survey if they have sent texts while driving.

~~The~~ A potential ~~issue~~ issue with the survey question is that it does not specify the amount of texts sent over time while driving //

No reference to respondents  
being untruthful.

- (c) Suppose 234 respondents were aged 18–24, and 288 respondents were aged 25–34.

Can a claim be made that a higher percentage of New Zealand drivers aged 18–24 will admit to talking on a mobile phone while driving (without a hands-free kit) than New Zealand drivers aged 25–34, based on the survey percentages presented in the report?

$$18-24 = 40\%$$

$$25-34 = 33\%$$

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

$$\text{difference} = 40\% - 33\% = 7\%$$

$$\text{difference} = 40\% - 33\% = 7\%$$

$$42.5 \quad 1.5 \times \frac{\text{MoE}_1 + \text{MoE}_2}{2}$$

$$1.5 \times \frac{6.537 + 5.893}{2} = 14.22\%$$

$$\text{MoE}_1 = \frac{1}{\sqrt{234}} \times 100 = 6.537\% \text{ (3dp)}$$

$$CI = [\text{diff} - \text{MoE} \times 1.5, \text{diff} + \text{MoE} \times 1.5]$$

Incorrect calculation for the margin of error

$$\text{MoE}_2 = \frac{1}{\sqrt{288}} \times 100 = 5.893\% \text{ (3dp)}$$

because the percentage is a negative it is not safe to claim that New Zealand drivers aged 18–24 is higher than 25–34.

- (d) The headline for this report is "Txting a top distraction for young drivers".

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

it is not safe to make the claim that 'texting a top distraction for young drivers' as in the statistical report and it claims that people who answered the survey only 20% sent text while driving and out of that 20% nearly 50% were young drivers (18–24).

No connections made to the summary statistics as to young drivers or texting being a distraction clearly

- (e) It is not clear in the article whether or not the survey of over 1000 New Zealand drivers involved only AA Insurance customers.

Describe ONE potential issue with using a random sample of AA Insurance customers to make generalisations about all New Zealand drivers.

Not All New Zealand drivers are with AA Insurance.  
meaning this is a potential issue as it is  
generalising New Zealand drivers. //

Only selection bias has  
been identified

inc

N2



### QUESTION THREE

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

- (a) The report states that "The data have been adjusted (weighted) according to 2013 Census data."

Explain why this was done.

people who could not ~~recall~~ recall how many drinks they had - so people guessed rather than having <sup>an</sup> accurate response - so they weighed out the data. //

No link made to being a representative sample representing population.

- (b) Figure 1 uses vertical lines (error bars) to represent 95% confidence intervals.

- (i) Give ONE reason why the vertical lines for the "never smokers" and "ex-smokers" are shorter than those for "current smokers".

~~the current smokers line is longer than~~  
the current smokers line is longer than people who never smoke and ex smoke because the variation of how often people smoke is larger which could mean it vertical line is longer. //

- (ii) The 95% confidence interval for the percent that engaged in risky alcohol consumption is (44%, 62%).

Use the margin of error associated with this of people in the sample who were current smokers.

$$MOE = \frac{1}{\sqrt{n}} \times 100$$

$$= \frac{1}{\sqrt{2594}} \times 100$$

$$= 1.963\%$$

Margin of error = 9%  
not identified

No links made to sample size increasing implies a margin of error decrease, or to the Rule of Thumb with proportion < 30%.



- (c) The report states that "After adjusting for confounding variables, current smokers and ex-smokers were more likely than never smokers to report engaging in risky alcohol consumption in the last four weeks."

Identify ONE potential confounding variable that may have needed to be taken into account, and discuss how this variable may have been confounding.

- (d) A potential non-sampling error for surveys is to

Fully describe how the behaviour of people who  
error for this survey, and discuss how it could ca

Only linking to being  
untruthful.

the behaviour of people could be a potential non sampling error as inaccurate ~~into~~ data could be recieved from those who were either drunk or high. or they didn't want to tell the ~~the~~ truth incase their parents or caregivers found out. it could be bias as where the door to door locations were, some suburbs in a city could have a higher alchole and smoking consumption than others //

1xc

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

QUESTION  
NUMBER

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