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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Statistics and Modelling, 2009

90642 Calculate confidence intervals for population parameters

Credits: Three
9.30 am Friday 20 November 2009

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

Make sure you have a copy of the Formulae and Tables Booklet L3–STATF.

You should answer ALL the questions in this booklet.

Show ALL working for ALL questions.

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 2–6 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.

For Assessor's use only	Achievement Criteria	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Calculate confidence intervals for population parameters. ☐	Demonstrate an understanding of confidence intervals. ☐	Demonstrate an understanding of the theory behind confidence intervals. ☐
Overall Level of Performance ☐		

You are advised to spend 35 minutes answering the questions in this booklet.

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LITTLE SPOTTED KIWI

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Ray Harris-Ching, *Voice from the Wilderness* (Auckland: Saint Publishing, 1994), p 152.

A population of little spotted kiwi is being studied on Kapiti Island.
Data from these birds is gathered.

QUESTION ONE

(a) A random sample of 45 little spotted kiwi was taken by the researchers in the summer of 2006. The weights of the little spotted kiwi in this sample were found to have a mean of 1257 grams and a standard deviation of 145 grams.

Find a 99% confidence interval for the mean weight of all little spotted kiwi on the island.

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(b) The researchers want to know if there is a difference between the mean weight of all male and the mean weight of all female little spotted kiwi on the island. A random sample of males and a random sample of females were taken in the summer of 2007. The results are summarised in the table below:

	Male kiwi	**Female kiwi**
Sample size	31	45
Sample mean (g)	1245	1321
Sample standard deviation (g)	125.8	169.7

Use a 95% confidence interval to determine if there is a difference between the mean weights of all male and all female little spotted kiwi on the island.

Justify your answer using statistical reasoning.

(c) A group of five **female** little spotted kiwi were randomly chosen from the 2007 sample of female kiwi in (b). These birds were transferred to a wildlife reserve as part of a breeding programme.

Find a 95% confidence interval for T, the total weight of five randomly chosen **female** little spotted kiwi from the 2007 sample.

QUESTION TWO

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(a) The little spotted kiwi is the smallest of the kiwi species. The researchers took a random sample of 32 mature little spotted kiwi on Kapiti Island in the summer of 2008 and measured their lengths.

(i) The lengths of the mature little spotted kiwi in this sample were found to have a mean of 41.3 cm and a standard deviation of 1.2 cm.

Find a 90% confidence interval for the mean length of all mature little spotted kiwi on the island.

(ii) The researchers stated that 5 of the mature little spotted kiwi from the sample were considered to be undersized.

Find a 95% confidence interval for the proportion of all mature little spotted kiwi on the island that are considered undersized.

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(b) Little spotted kiwi are assumed to have reached maturity four years after hatching. The researchers wish to estimate the proportion of all little spotted kiwi on the island that have reached maturity to within 15% of the population proportion with 99% confidence.

What is the minimum sample size that is required to meet this condition?

(c) Each breeding pair of little spotted kiwi has a particular territory in which they make their nest. In the 2008 study, **16 breeding pairs** of little spotted kiwi from Kapiti Island were randomly sampled. The researchers found that the mean territory area of these breeding pairs was 2.03 hectares and the standard deviation was 0.62 hectares.

A random selection of 24 pairs of little spotted kiwi are to be relocated from Kapiti Island to a different island, which has an area of 65 hectares.

Find a 90% confidence interval to estimate the **total** area required to accommodate the **24 breeding pairs**, AND comment on whether the new island would be of a suitable size for relocating the 24 breeding pairs, based on the 2008 sample.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number

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