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90646



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Level 3 Statistics and Modelling, 2011

90646 Use probability distribution models to solve straightforward problems

2.00 pm Monday 14 November 2011
Credits: Four

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.

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

If you need more room for any answer, use the extra space provided at the back of this booklet.

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.

ASSESSOR'S USE ONLY		Achievement Criteria	
Achievement		Achievement with Merit	Achievement with Excellence
Use probability distribution models to solve straightforward problems.	<input type="checkbox"/>	Use probability distribution models to solve problems.	<input type="checkbox"/>
		Use and justify probability distribution models to solve complex problems.	<input type="checkbox"/>
		Overall level of performance	<input type="checkbox"/>

You are advised to spend 45 minutes answering the questions in this booklet.

QUESTION ONE: PINES

Pine trees are grown in plantations in New Zealand. The rate of growth of the pine trees, per hectare, per year, is approximately normally distributed. The mean rate of growth is 32 m^3 per hectare per year. The standard deviation is 7.8 m^3 per hectare per year. Some plantations achieve a growth rate of more than 40 m^3 per hectare per year.

- (a) Calculate the probability that a growth rate of more than 40 m^3 per hectare per year is achieved in a randomly chosen hectare.

- (b) Calculate the lower quartile for the growth rate.

QUESTION TWO: MOREPORKS

A conservationist has permission to enter a pine plantation to capture moreporks and fit leg bands on them so the birds can be studied.

You may assume that moreporks are located randomly and independently throughout the plantation.

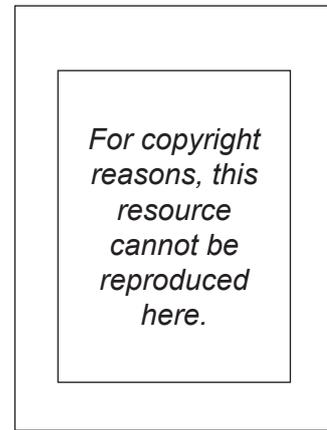
- (a) 70 percent of the capture attempts are successful.

The conservationist locates 4 moreporks on his next trip.

Calculate the probability that at least one of these birds is successfully captured.

- (b) Throughout the plantation there are approximately 0.08 moreporks per hectare on average. The conservationist searches 5 hectares.

- (i) Calculate the probability that the conservationist locates, **and then** successfully captures exactly two moreporks.



<http://tane.mhjc.school.nz/images/addendum/morepork.jpg>

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