

L3-STATF



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

3



## Level 3 Mathematics and Statistics (Statistics), 2013

9.30 am Wednesday 20 November 2013

**FORMULAE AND TABLES BOOKLET**  
for 91584, 91585 and 91586

Refer to this booklet to answer the questions in your Question and Answer booklets.

Check that this booklet has pages 2–4 in the correct order and that none of these pages is blank.

**YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.**

© New Zealand Qualifications Authority, 2013

All rights reserved. No part of this publication may be reproduced by any means without the prior permission of the New Zealand Qualifications Authority.

## STATISTICS AND MODELLING – USEFUL FORMULAE AND TABLES

### Permutations and Combinations

$${}^n P_r = \frac{n!}{(n-r)!}$$

$$\binom{n}{r} = {}^n C_r = \frac{n!}{(n-r)!r!}$$

### Expectation Algebra

$$E[aX + b] = aE[X] + b$$

$$\text{Var}[aX + b] = a^2 \text{Var}[X]$$

$$E[aX + bY] = aE[X] + bE[Y]$$

$$\text{Var}[aX + bY] = a^2 \text{Var}[X] + b^2 \text{Var}[Y]$$

if  $X, Y$  are independent

### Probability

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

### Mean and Variance of a Discrete Random Variable

$$\begin{aligned} \mu &= E(X) & \sigma^2 &= \text{Var}(X) \\ &= \sum x.P(X = x) & \sigma &= \text{SD}(X) \\ & & &= \sqrt{\sum (x - \mu)^2 . P(X = x)} \\ & & &= \sqrt{E(X^2) - [E(X)]^2} \end{aligned}$$

### Continuous Uniform Distribution

The probability density function,  $f(x)$ , for a continuous uniform distribution is defined as:

$$f(x) = \begin{cases} \frac{1}{b-a}, & \text{for } a \leq x \leq b \\ 0, & \text{elsewhere} \end{cases}$$



