NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Assessment Report

Scholarship, 2006

Statistics and Modelling

Statistics and Modelling, Scholarship, 2006

Commentary

The overall standard of student answers was slightly higher compared with 2005. Students and teachers are now familiar with the format of a theme paper. The following general points are worth noting:

1. When candidates attempt a question twice they must indicate which answer they want marked.
2. Candidates should define the variables they are using and be able to describe things fully.
3. Premature rounding to one or two decimal places was more prevalent in 2006.

The best performing candidates most commonly demonstrated the following skills and /or knowledge:

- Strong algebra skills indicated by:
  - being able to use algebraic manipulations confidently to solve a variety of equations
  - using successful strategies to find solutions to equations when presented with non-whole number possibilities for linear programming problems
  - being able to identify and use non-unique solutions to simultaneous equations with three unknowns
  - possessing accurate graphing skills
  - demonstrating a solid understanding of the key features of linear, non-linear and piecewise graphs and functions.
- Well developed statistical reasoning skills by being able to:
  - relate statistical theory to the context of problems to present valid solutions, descriptions or conclusions
  - justify their conclusions
  - assess the strength of the evidence provided using appropriate statistical techniques, including formal inferential techniques such as confidence intervals and probabilistic modelling
  - show high level critical thinking when answering questions
  - apply their knowledge effectively to given situations.
- Excellent communication skills by:
  - presenting concise reports that had a clear structure and were written using correct statistical terms
  - making statements based on the features of the data and the information provided, with interpretations and inferences made relevant to the context of the data.
  - discussing the validity of forecasts
  - making suggestions for improvements that were based on evaluating the weaknesses of the statistical methods or the impact of specific contextual factors
  - making comments that were not speculative in nature.
- Well developed problem solving skills by:
  - applying basic skills appropriately such as finding optimal points, constructing confidence intervals, conditional probability, probability trees and applications to relevant formulae, eg in the yoghurt modelling situation they defined variables where appropriate, provided details where necessary and gave the critical points on the graph.

Candidates who did NOT achieve scholarship lacked some or all of the skills and knowledge above and in addition they:

- lacked precision in their language, eg “Find a difference of two means” rather than “confidence interval for the difference between the two means” or “profit” rather than “sales”

- were unable to select and combine knowledge and skills from separate achievement standards to solve problems
- were unaware of how to get whole number solutions and how to differentiate between “independent” and “mutually exclusive”
- were unable to interpret constraints like: “no more than seven boxes of standard yoghurt are to be produced for every two boxes of light yoghurt”
- were unable to relate numerical answers to the actual question
- did not use statistics in their descriptions
- showed poor graphing skills and had difficulty in handling piecewise functions
- were unable to tackle unfamiliar situations and apply statistical thinking
- could not set up equations
- struggled with the concept of ratio with the constraints and the Sales Ratio (SR)
- did not relate their report answers to predictions
- did not take seasonal effects into account when appropriate
- did not distinguish between factual observation and their own deductions when writing a report
- made remarks that were vague, speculative, verbose, irrelevant and lacked clarity
- made invalid forecasts
- were unable to suggest improvements
- presented no “statistical evidence” in their reports
- were confused about time series and bi-variate graphs and interpreted the time series as an association and the bi-variate graph as something over time.