# Scholarship

# 2012 Assessment Report

# Statistics and Modelling

## COMMENTARY

Overall the standard of the candidates answers was satisfactory however at a slightly lower level than last year. The best answered questions were the written interpretive style Questions Two and Four. The hardest questions requiring more mathematics were Questions Three and Five involving probability and linear programming respectively. Many candidates were able to start these questions however their ability to complete them by examining all cases was a deciding factor for them to achieve high marks.

## SCHOLARSHIP WITH OUTSTANDING PERFORMANCE

**Candidates who were awarded Scholarship with Outstanding Performance typically:**

- understood why samples were taken to make population inferences. In doing so they linked the required level of accuracy to practical considerations for sampling from a population and the level of confidence for the inference. Evidence was provided when necessary to support their statements when describing how to complete the task at hand in Question 1 (a) (iii)
- gave examples with values (numbers) and context when describing, by comparing and contrasting, data and graphs. In Question 2, they identified possible related continuous variables that could also affect the response variable for bivariate data and described both the strength and direction of these relationships. Also clear evidence was presented when commenting on the validity of predictions
- dealt with harder calculation problems and could persevere with these in Question 3. In doing so they used appropriate diagrams and probability calculations to find unknown probabilities correctly and in context involving multiple events
- dealt with harder calculation problems and could persevere with these in Question 5. They formed equations when necessary to find solutions to abstract scenarios requiring generalising the relationships between the constraints, objective function and optimal value for linear programming problems. This was shown by calculating the correct value of c in Question 5 (b) by considering all possibilities then finding the one possibility for the value of c that gave the least cost
- used CPI indexes in relation to time series data to calculate and interpret growth by calculating the percentage correctly in Question 4 (c)
- communicated their thinking clearly, logically and effectively. They demonstrated an ability to think through and interpret their answers and not simply write a pre-learned sentence. Their high level of mathematical and statistical thinking was evidenced by their answers to Question 1 (a) and Q3.

## SCHOLARSHIP

**Candidates who were awarded Scholarship but not Scholarship with Outstanding Performance typically:**

- wrote reports and made relevant comments in context
- constructed and interpreted confidence intervals in context
- displayed an understanding of the wide range of content
- showed some ability to draw appropriate conclusions
- calculated the sample size correctly in Question 1 (a) and identified the fact that the sample size was too big for Question 1 (a) (iii) but did not describe how to complete the task

- identified and described at least three key features of bivariate data with corresponding context taking into account the nature of the variables
- referred to their graphs when commenting on the validity of their estimates and forecasts in terms of their strength and appropriateness of the model
- made several valid comments on the scatterplots (often in context)
- were able to apply Binomial probabilities successfully in an unfamiliar context to come up with the correct conditional probability in Question 3 (c)
- were able to write a report about the daily gym attendance and monthly income with numbers with corresponding context in Question 4 (b)
- formulated correct algebraic constraints for Q5 and could graph these and find the optimal point through a systematic process.

## OTHER CANDIDATES

**Candidates who were not awarded Scholarship or Scholarship with Outstanding Performance typically:**

- omitted reference to the context, population or statistical values when writing statements
- disregarded sampling variability as an explanation for difference
- failed to complete the second half of most questions
- used generic statements and general comments without really understanding the meanings of their numerical answers
- contradicted themselves within a question or produced a “sit on the fence” argument
- displayed poor algebra skills i.e. an inability to rearrange a formula or to correctly substitute into a formula
- failed to demonstrate adequately any knowledge of probability and mathematical problem solving techniques required at this level
- were unable to interpret confidence intervals and/or the calculated sample size in Question 1
- described features of bivariate data without referring to the context or nature of the variables
- calculated one or more correct predictions in Question 2 (b) and Question 4 (b) but failed to make correct validity statements
- wrote extremely vague comments in their reports especially in Question 2 (a) and Question 4 (a). There was little or no mention of actual numbers or dollar values
- had no strategy to begin working on the harder calculation probability problems in Question 3
- could not deal with being supplied with extra numbers in the question so consequently they were unable to select the values required to calculate the confidence intervals in Question 1 (a) and how to proceed in Question 3 (a)
- over-simplified situations involving chance
- were unable to describe correct forecasts with an appropriate corresponding validity comment about it for Question 4 (b)
- describe features of time series data without using numerical values
- failed to show all the constraints in Question 5 and did not understand the difference between gradient and optimal solution.