INTERNATIONAL CENTRE
OF EXCELLENCE FOR
EDUCATION IN
MATHEMATICS

Population Modelling of Time Varying Vital Rates and Immigration
Minh Van Nguyen, School of Computer Science and Mathematics, Victoria University

This was a six-week summer vacation project, undertaken during February and early March of 2006 under the supervision of Associate Professor Pietro Cerone and Dr Jakub Szajman. For background information, the vacation scholar familiarised himself with the area of demography. A major objective of the project was the numerical solution of a basic human population model. At the outset the scholar learnt the FORTRAN programming language, especially the FORTRAN 77 standard, and he investigated the operation of an existing FORTRAN programme written over thirty years ago by A/Professor Cerone. In these tasks, technical assistance was rendered by Dr Szajman.

Initially a few components of the programme were readily available as electronic text files. Those which were not so available were converted to such format. Thus those various components were typed from a photocopied version of the original source code printout, resulting in errors of various sorts being inadvertently introduced into the text files containing the newly typed code. The first two weeks of the project were spent debugging the overall programme.

The first half of the third week was spent preparing for an oral presentation to be delivered at the Lindfield branch of CSIRO, over the time period 16th–17th February 2006 (the "Big Day In!" convention). During the fourth week, a small portion of the programme was slightly modified to account for real world data. In the final two weeks, an attempt was made to numerically determine the transient population numbers and age distribution of the population model under consideration.

That which was accomplished during this project serves to provide a foundation for future on-going work in the modelling of transient population dynamics under changing vital rates and immigration. There exist mathematical human population models that take immigration into account and these predict long term or asymptotic behaviours of such models. However one of our objectives for future work is to develop/assemble a suite of FORTRAN programmes that provides behaviours of various human population models in the immediate term.

The scholar wishes to acknowledge A/Professor Cerone and Dr Szajman for providing him with the opportunity to undertake some research over the summer vacation. Furthermore he is grateful to ICE-EM/AMSI for the financial support during this project and especially for organising the "Big Day In!" convention.