PERSONAL ITEMS

Professor B.R. Gelbaum of the State University of New York at Buffalo is a Fulbright Senior Scholar visiting the Mathematics Department of University College, Galway during the period January 1st to April 30th 1985. Professor Gelbaum's interests are in Boolean Algebra, Probability Theory and Stochastic Processes.

Dr T. Hurley of the Mathematics Department, University College, Galway is on leave of absence this academic year at the Australian National University In Canberra.

Professor D. McQuillan of the Mathematics Department, University College, Dublin has been recently elected Dean of the Faculty of Arts at U.C.D.

Dr I.G. O'Muircheartaigh of the Mathematics Department, University College, Galway has been promoted to the rank of Associate Professor of Statistics (within the Department of Mathematics).

**** *STOP PRESS* ****

Des MacHale's biography "*George Boole: his life and work*" has just appeared. This happy event has caused no little rejoicing in the MacHale household, but there seems to be some confusion: "Why did he write all that stuff about a footballer anyway!?"

LETTER TO THE EDITOR

Stichting Mathematisch Centrum,
Centrum voor Wiskunde en Informatica,
Kruislaan 413,
1098SJ Amsterdam.

26 November 1984

Dear Sir/Madam,

We should be greatly obliged if you would place a notice in the Bulletin for your members about the project on "grey literature" initiated by the European Mathematical Council.

As the need for greater accessibility of "grey literature" on mathematics is widely felt, it has been proposed by the European Mathematical Council that all European mathematical institutes will send one copy of each of their *informal* publications, such as reports, theses, proceedings of meetings, etc., but not reprints, to the Centrum voor Wiskunde en Informatica (CWI) in Amsterdam. Lists of titles of publications received as part of this project are published by CWI and distributed among the participants.

In order to make these lists as useful a tool as possible, publications are listed by subject. Participants are therefore urgently requested to add, where necessary, classification codes according to the 1980 Mathematics Subject Classification scheme of *Mathematical Reviews* and *Zentralblatt*, as well as an English title and abstract, so that eventually KWOT-indexes may be produced.

A great many institutes in Europe are already taking part in this project. As so far response from institutes in your country has not been very great, we hope to draw their interest to this project through your association. Our correct mailing address for reports, etc., is:

Centrum voor Wisjunde en Informatica,
Library,
P.O. Box 4079,
1009 AB Amsterdam,
The Netherlands.

Thank you very much in advance for your cooperation.

Yours sincerely,

Ms Joke Sterringa

Library

CURVE SMOOTHING USING SPLINES

Don Barry

1. INTRODUCTION

Consider a set of data (x_i, y_i), $i = 1,2, \ldots, n$ with $0 \leq x_1 < x_2 < \ldots < x_n \leq 1$ and $y_i = F(x_i) + e_i$, $i = 1,2, \ldots, n$ where F is a well behaved function of x and the errors $\{e_i\}$ are independently and identically distributed each with mean zero and variance v. F is known as the regression function of Y on X and its estimation from a finite set of observations is one of the central problems in statistics.

The usual parametric approach to regression estimation assumes F to lie in span $\{\phi_j : 1 \leq j \leq m\}$, the set of linear combinations of the basis functions $\phi_1, \phi_2, \ldots, \phi_m$ and then estimates F by the function $\hat{F}$ in span $\{\phi_j : 1 \leq j \leq m\}$ which minimises the residual sum of squares given by

$$\text{Res. SS} = \sum_{i=1}^{n} (y_i - \hat{F}(x_i))^2.$$

Classical polynomial regression uses as basis functions

$$\phi_j(x) = x^{j-1}, \quad j = 1,2, \ldots, m.$$

We wish to choose $\hat{F}$ in a larger class of functions containing span $\{\phi_j : 1 \leq j \leq m\}$ as a subset. We minimise the Res SS plus a penalty corresponding to a measure of the distance of F from span $\{\phi_j : 1 \leq j \leq m\}$. For example we might choose $\hat{F} \in H^{(2)}$ to minimise

$$\sum_{i=1}^{n} (y_i - g(x_i))^2 + c \int_0^1 g''(x)^2 dx$$

where $H^{(2)} = \{g : [0,1] \to R \mid g, g' \text{ are absolutely continuous and } \int_0^1 g''(x)^2 dx < \infty\}$. The presence of the penalty imposes smoothness on the estimator. If we cannot make any smoothness ass-