CONFERENCE ANNOUNCEMENTS

LIMERICK MATHEMATICS 1982.

A two-day Algebra Conference will be held at Mary Immaculate College, Limerick on November 12th and 13th, 1982. The main speakers are Prof. J.G. Thompson (Cambridge), Prof. T.J. Laffey (U.C.D.), Prof. M.L. Newell (U.C.G.) and Dr. D. MacHale (U.C.C.). Persons seeking further details or willing to give short talks of up to 20 minutes duration are invited to contact the organiser Dr. G.M. Enright, Mathematics Department, Mary Immaculate College, South Circular Road, Limerick. Phone (061)44588.

MASECODE III.

The Third International Conference on the Numerical Analysis of Semiconductor Devices and Integrated Circuits will be held in Galway from 15th to 17th June 1983, under the auspices of the Numerical Analysis Group and cosponsored by the Electron Devices Society of the IEEE, the Institute for Numerical Computation and Analysis and the Irish Mathematical Society.

Contributed papers are solicited from engineers, physicists and mathematicians on any topic relevant to the numerical analysis, modelling and optimization of electronic, opto-electronic and quantum electronic semiconductor devices and integrated circuits. The deadline for the receipt of abstracts and preliminary versions of 20-minute contributed papers is 18th February, 1983. All correspondence should be addressed to: MASECODE Conference, 39 Trinity College, Dublin 2. Phone (01) 772941 ext. 1869/1949.

I.C.M.E. - V

The Fifth International Congress on Mathematics Education will be held in Adelaide, South Australia, in August 1984. The chairman of the International Program Committee is Dr. M.F. Newman, Department of Mathematics, Australian National University, Canberra.

INFINITE EXPONENTIALS

P.J. Rippon

A question of the following type appeared during 1981 in a Regional Math. Contest for high school students in the U.S.A. and caused some difficulties for the referees present.

"Find all the real numbers a such that

$$a^{a^{a^{\cdot^{\cdot^{\cdot}}}}} = 8." \qquad (1)$$

The expected answer, presumably, was that

$$a^{a^{a^{\cdot^{\cdot^{\cdot}}}}} = a^{\left(a^{a^{\cdot^{\cdot^{\cdot}}}}\right)} = a^8 = 8,$$

and so $a = 8^{1/8}$. Here (1) has been taken to mean that the sequence $a, a^a, a^{(a^a)}, \ldots$, which we shall denote throughout by

$$a_1 = a, \quad a_{n+1} = a^{a_n}, \qquad (n = 1,2, \ldots) \qquad (2)$$

converges to 8. Now it is not immediately obvious that the sequence a_n will be convergent when $a = 8^{1/8} \approx 1.3$ and this difficulty occurred to the referees at the Math. Contest. In fact it turns out that the sequence is convergent. Unfortunately however it does not converge to 8 and the question was very nearly scrubbed!

In this article I shall attempt to explain the somewhat surprising facts outlined above and survey a number of the known results about the convergence of such 'infinite exponentials'. Both the real and complex cases will be discussed and some new results given. I am greatly in debt to the survey by Knoebel [4] which appeared coincidentally at about the same time as the Math. Contest and which contains a huge bibliography on this topic. I am also grateful to Leon Greenberg, whose ingenious approach to the convergence of a_n (for real a) first kindled my interest in this problem, and to many colleagues and students at U.C.C. for advice and encouragement, particularly with the computer.

To see why $a = 8^{1/8}$ is not a solution of (1) we consider the graph of $y = x^{1/x}$, $x > 0$.