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PROGRAMMING THE FUNCTIONS OF FORMAL LOGIC. II
(Multi-valued Logics)

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We consider here in greater detail a problem mentioned en passant in our previous paper[1] viz., the programming of problems in multi-valued logic for solution by means of a digital computer. Once again, to give the inquiry a definite direction a particular problem is chosen for discussion. This problem has already been discussed by Rose[2] but from a different point of view; it has already been attacked from an entirely different direction, and some solutions obtained, by programme on DEUCE and ACE.[3,4]

The discussion divides naturally into three parts: a description of the machine which is to be programmed to obtain a solution to the problem; the problem to be solved and the formal multi-valued logic used to obtain a solution.

I The Machine In our previous paper we discussed the use of a digital computer working in the binary scale of notation i.e. each number or "machine word" is represented in the machine in the form

$$\sum_{i=1}^{n-1} a_i 2^{i-1} \quad (1 \leq i \leq n-1;\ a_i = 0 \text{ or } a_i = 1).$$

Because of such number representation a binary machine is particularly suitable for operating on the values of two-valued propositional variables.

Our present problem is solved in terms of multi-valued logic, although a multi-valued logic can be represented within a two-valued system. The calculation of the values of logical functions is easier of the radix of the number system coincides with that of the n-valued logic used. However, a decimal machine is easier to use than a binary machine for programmes written in an n-valued logic.

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1. This Journal, v. III No. 3. No knowledge of this paper is assumed.
2. cf ref. (1) at end.
3. cf ref. (2) at end.
4. See ref. (4).

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