

$\wp_2, \dots, \wp_7$ , and of orders 48, 128, and 336 at  $A$ ,  $B$ , and  $C$ , respectively; and so on.

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UNIVERSITY OF ILLINOIS

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## A NOTE ON THE REDUCTION OF GENTZEN'S CALCULUS LJ\*

H. B. CURRY

The reduction given by Gentzen† of his calculus LJ to the modified Heyting calculus LHJ is somewhat involved because he reduces everything to the axioms without assuming any knowledge of the calculus. By the use, however, of certain general theorems it is possible to simplify the reduction. The purpose of this note is to present an alternative reduction based on this principle. Although this new reduction may, if all the assumptions used are proved in detail from the axioms, conceivably be longer than Gentzen's, yet the formulas and principles established at the beginning (in §§1–4 below) are for the most part well known (or at least of some interest on their own account), and in terms of these the reduction (in §5) is almost immediate.

The new method has the further merit of showing, if we take the axioms of LHJ as a basis, that the schemes for implication follow from the axioms for implication only‡ and that those for conjunction, negation, and the quantifiers, respectively, involve only the axioms for implication and those for the operation concerned.§ It

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† G. Gentzen, *Untersuchungen über das logische Schliessen*, Mathematische Zeitschrift, vol. 39 (1934), pp. 417–428.

‡ The scheme “Verdünnung im Sukzedens” is essentially a scheme for negation.

§ This statement requires that the formula 1.42 (below) be postulated as axiom of LHJ; to derive 1.42 from LHJ as it stands requires properties of conjunction.