

II. "A Fourth Memoir upon Quantics." By ARTHUR CAYLEY,
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(Abstract.)

The object of the present memoir is the further development of the theory of binary quantics ; it should therefore have preceded so much of my third memoir, vol. cxlvii. (1857), p. 627, as relates to ternary quadrics and cubics. The paragraphs are numbered continuously with those of the former memoirs. The first three paragraphs, Nos. 62 to 64, relate to quantics of the general form $(\sum x, y, \dots)^m$, and they are intended to complete the series of definitions and explanations given in Nos. 54 to 61 of my third memoir ; Nos. 68 to 71, although introduced in reference to binary quantics, relate or may be considered as relating to quantics of the like general form. But with these exceptions the memoir relates to binary quantics of any order whatever : viz. Nos. 65 to 80 relate to the covariants and invariants of the degrees 2, 3, and 4 ; Nos. 81 and 82 (which are introduced somewhat parenthetically) contain the explanation of a process for the calculation of the invariant called the discriminant ; Nos. 83 to 85 contain the definitions of the catalecticant, the lambdaic and the canonisant, which are functions occurring in Prof. Sylvester's theory of the reduction of a binary quantic to its canonical form ; and Nos. 86 to 91 contain the definitions of certain covariants or other derivatives connected with Bezout's abbreviated method of elimination, due for the most part to Professor Sylvester, and which are called Bezoutiants, Cobezoutiants, &c. I have not in the present memoir in any wise considered the theories to which the catalecticant &c. and the other covariants and derivatives just referred to relate ; the design is to point out and precisely define the different covariants or other derivatives which have hitherto presented themselves in theories relating to binary quantics, and so to complete, as far as may be, the explanation of the terminology of this part of the subject.