26. Disjunctive Sums.—By means of development we can transform any sum into a *disjunctive* sum, *i. e.*, one in which each product of its summands taken two by two is zero. For, let $(a+b+c)$ be a sum of which we do not know whether or not the three terms are disjunctive; let us assume that they are not. Developing, we have:

$$a+b+c=abc+abc'+ab'c+ab'c'+a'bc+a'bc'+a'b'c.$$

Now, the first four terms of this development constitute the development of a with respect to b and c; the two following are the development of $a'b$ with respect to c. The above sum, therefore, reduces to

$$a+a'b+a'b'c,$$

and the terms of this sum are disjunctive like those of the preceding, as may be verified. This process is general and, moreover, obvious. To enumerate without repetition all the a's, all the b's, and all the c's, etc., it is clearly sufficient to enumerate all the a's, then all the b's which are not a's, and then all the c's which are neither a's nor b's, and so on.

It will be noted that the expression thus obtained is not symmetrical, since it depends on the order assigned to the original summands. Thus the same sum may be written:

$$b+ab'+a'b'c, \quad c+ac'+a'bc', \ldots.$$

Conversely, in order to simplify the expression of a sum, we may suppress as factors in each of the summands (arranged in any suitable order) the negatives of each preceding summand. Thus, we may find a symmetrical expression for a sum. For instance,

$$a+a'b=b+ab'=a+b.$$

27. Properties of Developed Functions.—The practical utility of the process of development in the algebra of logic lies in the fact that developed functions possess the following property:

The sum or the product of two functions developed with respect to the same letters is obtained simply by finding the sum or the product of their coefficients. The negative of a