$\sigma_2 = 5^4 \cdot 18.$ $\tau_1^5 + \tau_4^5 = -5^4 \cdot 6,$ $\tau_1^5\tau_4^5 = 3^5 \cdot 5^5,$ $\tau_1^5 = -1875 + 525\sqrt{10},$ $\tau_4^5 = -1875 - 525\sqrt{10}.$ $\tau_2^5 + \tau_3^5 = 5^4 \cdot 18,$ $\tau_2^5\tau_3^5 = -3^5 \cdot 5^5,$ $\tau_2^5 = 5625 + 1800\sqrt{10},$ $\tau_3^5 = 5625 - 1800\sqrt{10}.$ $5x = \tau_1 + \tau_2 + \tau_3 + \tau_4.$

The connection with Runge's resolvent is effected by the relation

$$\rho = -5\beta\frac{v - 5\alpha}{v - \alpha},$$

by which equation (1) may be verified. The relation

$$\sigma = \frac{-5^4\beta}{2(v - \alpha)}(v - 5\alpha + \sqrt{v^2 - 6\alpha v + 25\alpha^2}),$$

which includes the preceding and gives the key to equations (2) and (3), was worked out by Lagrange's theorem.

COLUMBIA UNIVERSITY,
April 6, 1915.

THE MADISON COLLOQUIUM LECTURES ON MATHEMATICS.

Part I: On Invariants and the Theory of Numbers. By LEONARD EUGENE DICKSON. New York, American Mathematical Society, 1914.

THE number of new mathematical systems which may be characterized as distinct mutations, whose discovery or development is to be credited to American research, has shown a marked increase within a few decades. The reviewer of Professor Dickson's Lectures of the Madison Colloquium volume has the satisfaction of recording one of these great discoveries, his theory of classes in invariant theory, and of observing how as a result of this discovery, number theory, which long had little contact with the theory of invariants, now has very much in common with it. Dickson's technical memoirs in which the theory of classes and the invariant theory of modular forms were first expounded appeared in 1909. And while the material and indeed much of the method also of the Colloquium Lectures are new, they are dominated by the theory of classes and may, therefore, be regarded as a superstructure of the system founded in his 1909 papers. Lecture I may be regarded also, as introductory to the theory as a whole.