and its solutions are elements $\mu \in M$, where $\phi(\mu)=0$ for all $\phi \in S$. An "auxiliary" ideal $\mathfrak{a} \subseteq P$ corresponds to S. The general point ξ of an $(n-i)$-dimensional associated prime $\mathfrak{p}$ of a primary component $\mathfrak{q}$ of $\mathfrak{a}$ determines a "general" $(n-i)$-dimensional exponential solution $\exp(\xi) \in M$ of S. The differential exponent of $\mathfrak{p}$ is δ if a polynomial f with i variables and with coefficients in the field of rational functions of $\mathfrak{p}$, where $f \exp(\xi)$ is a solution of S, has at most degree $\delta-1$. The relationships are studied between δ, the ordinary exponent ρ of $\mathfrak{q}$, the Hentzelt exponent ν of $\mathfrak{q}$, and the multiplicity σ of the root which corresponds to $\mathfrak{p}$ of the $(n-i)$-dimensional elementary divisor of $\mathfrak{a}$. When $\mathfrak{p}$ is isolated and either $p=0$ or $\delta<p$, $\rho=\nu=\sigma=\delta$. When $p\neq 0$, and $\delta \geqq p$, $\rho \leqq \nu$, $p \leqq \nu$, $p \leqq \sigma$. (Received January 17, 1945.)

59. W. J. Sternberg: *On a special set of algebraic nonlinear equations.*

Some physical problems lead to algebraic nonlinear equations, such as the following set $\sum_{i=1}^{3} 1/(x_i/s_k+jy_i)=1/(a_k/s_k+jb_k)$, where $k=1, 2, 3$, $j=(-1)^{1/2}$, $s_1^2\neq s_2^2$, $s_2^2\neq s_3^2$, $s_3^2\neq s_1^2$. An analogous set of two or four or more equations could also be treated. The unknowns are x_i, y_i, while a_k, b_k, s_k are given. The above complex equations are equivalent to six real equations. The transformation $u_i=y_i/x_i$, using the abbreviation $1/(1+s_k^2u_i^2)=f_k(u_i)$ $[i, k=1, 2, 3]$, leads to $\sum_{i=1}^{3} f_k(u_i)/x_i=A_k$, $\sum_{i=1}^{3} u_if_k(u_i)/x_i=B_k$ where A_k, B_k can be computed from a_k, b_k, s_k. Since the above equations are linear with respect to $1/x_i$, eliminate these unknowns and obtain for the u_i three nonlinear equations, whose left sides are determinants. These determinants are rational alternating functions of the u_i. Simplify the said equations and introduce the elementary symmetric functions w_1, w_2, w_3 of the u_i. The point is that finally three linear equations are obtained for w_1, w_2, w_3. They are uniquely determined and the equation with the roots u_1, u_2, u_3 can be found. The problem is therefore reduced to one equation of third degree. (Received January 20, 1945.)

60. H. S. Wall: *Polynomials with real coefficients whose zeros have negative real parts.*

Let $P(z)=z^n+a_1z^{n-1}+a_2z^{n-2}+\cdots+a_n$ be a polynomial with real coefficients, and let $Q(z)$ be the polynomial obtained from $P(z)$ by dropping out the first, third, fifth, $\cdots$ terms of $P(z)$. Then, the zeros of $P(z)$ all have negative real parts if and only if the successive quotients obtained in applying to $P(z)$ and $Q(z)$ the euclidean algorithm for finding the greatest common divisor of two polynomials have the form $c_1z+1, c_2z, c_3z, \cdots, c_nz$, where $c_1, c_2, \cdots, c_n$ are positive. On the basis of this result, a new proof is obtained of a theorem of A. Hurwitz (*Werke*, vol. II, p. 533 ff.). (Received January 24, 1945.)

Analysis

61. Felix Bernstein: *The integral equations of the theta function.*

In 1920 the author showed that the integral equation $\vartheta*\vartheta-2t\vartheta+\vartheta*1-1=0$ $(\vartheta*\vartheta=\int_0^t\vartheta(\tau)\vartheta(t-\tau)dt)$ for the variable $h=e^{-\pi^2t}$ has the theta zero function $\sum_{-\infty}^{+\infty}h^{n^2}$ as the only solution analytical and regular in the unit circle at the origin. In subsequent papers it has been brought out that this equation defines relationships of the theta zero function to the theory of heat and a number of new theorems. The transcendent theorems of addition have been derived. It has been shown that the Volterra theory