Laplace transform, $L(s; f)_h$, is meant a linear functional of f with the fundamental property that $L(s; hf)_h = sL(s; f)_h - f(t_0)$. Clearly $\int_{t_0}^{\infty} \exp -s(t-t_0)f(t)dt$, $\sum_{t_0}^{\infty} f(i)s^{-i-1+t_0}$, $\int_{t_0}^{\infty} t^{-s-1}t_0^s f(t)dt$, $\sum_{t_0}^{\infty} f(i)(1+s)^{-i+t_0-1}$ are generalized L.T.'s for d/dt, E, td/dt, and Δ respectively. It may be verified that the appropriate expression is in every case given formally by $\lim_{t\to\infty} F(t, s, 0; f)F(t, s, 1; 0)^{-1}$. Tables of transform pairs may be set up for practical use precisely like those of the usual Laplace transform. Regions of convergence must be determined for each different operator; however, in practice it is often possible to get the correct answer by proper "interpretation" even when convergence fails. (Received January 15, 1947.)

149. Fred Supnick: *Cooperative phenomena.* II. *Structure of the two-dimensional Ising model.*

Let a distribution of A's and B's be made over the vertices of a linear graph G in which any two vertices are joined by at most one edge. Associate with each edge a $(+1)$ or a (-1) accordingly as its end points are the same or different. Denote the sum of the numbers on the edges by E (the energy). The (physical) partition function is obtained by putting E into the Boltzman exponential and summing over all possible states In this paper the author examines from a combinatorial point of view the structure for the case where G is a portion of a (plane or cylindrical) rectangular grating. A method is obtained for constructing all those distributions which have the same energy. An examination of the structure of the three-dimensional model is also made. It is pointed out that the problem of reducing "end effects" is equivalent to certain problems in the topology of sphere clusters. (See Bull. Amer. Math. Soc. Abstracts 52-9-323 and 52-11-386 by the author.) (Received January 17, 1947.)

Geometry

150. John DeCicco: *An extension of Euler's theorem on homogeneous functions.*

The author determines the partial differential equation of order r to be obeyed by a function $\phi(x, y)$ which is the sum of r homogeneous functions with degrees $n, n-1, n-2, \cdots, n-r+1$. It is observed that such a function $\phi(x, y)$ may be said to be of degree n and is a generalization of a polynomial. This is related to the problem of determining all the algebraic curves C_n of degree n such that the $(n-r)$ polars C_r of degree r all pass through a fixed point O. This point O is a singularity of C_n of order $(n-r+1)$. For example, if the polar conics all pass through a given point O, then O is a singularity of C_n of order $(n-1)$. This whole theory is extended quite readily to any number of dimensions. (Received January 31, 1947.)

151. John DeCicco: *New proofs of the theorems of Kasner concerning the infinitesimal contact transformations of mechanics.*

The author submits new proofs of the theorems of Kasner concerning the infinitesimal contact transformations of general dynamics. (See *The infinitesimal contact transformations of mechanics*, Bull. Amer. Math. Soc. vol. 16 (1910) pp. 408–412)). The theorems deal with the nature of two dynamical systems of the same number of degrees of freedom for which the commutator or alternant of the associated infinitesimal contact transformations is a point transformation. The main result is that this situation can arise if and only if the expressions for the kinetic energy are the same or differ merely by a factor. The other proposition is that two infinitesimal contact transformations with the same transversality law will have a point transformation