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English summaries

Judit Abardia-Evéquoz

Difference and projection bodies in convex geometry

In this paper we present some notions and classical results from convex geometry which have found numerous applications. We concentrate on three families of convex bodies: ellipsoids, centrally symmetric convex bodies and zonoids, and describe some of their applications in geometry. For instance, we prove Minkowski's first theorem on the geometry of numbers, the existence of an ellipsoid of maximal volume inside a convex body —the so-called John ellipsoid— and study Shephard's problem, which asks if there are pairs of bodies one with a smaller volume than the other, but with larger projections. The centrally symmetric bodies and the zonoids are also described as the range of certain operators: the difference and projection operators. At the beginning of this paper we present the basic notions of convex geometry that will be used throughout and take a brief look at the combinatorial geometry, presenting Helly's theorem and some of its consequences.

Keywords: Helly's theorem, difference body, projection body, centrally symmetric convex body, ellipsoid, zonoid, Rogers-Shephard inequality, Petty projection inequality.

MSC2010 Subject Classification: 52A20.

Armengol Gasull and Mireia Llorens

Computing integrals through discrete dynamical systems

If for a family of defined integrals, depending on parameters, the value of the integral remains unchanged when the values of the parameters vary in some

special way, it is said that this change of parameters is a Landen transformation. Analogously, using dynamical systems terminology, this defined integral is a first integral of the discrete dynamical system associated with the Landen transformation. These transformations exist, for instance, for some families of elliptic integrals or for certain rational integrals. In this paper we present several examples of Landen transformations and we apply them to the computation of defined integrals. We also recall the Brent-Salamin algorithm for computing π, because it is based on these types of transformations. As we will see, the global dynamics of certain Landen transformations are far from being fully understood.

Keywords: defined integral, Landen tranformation, elliptic integral, discrete dynamical system, Brent-Salamin algorithm.

MSC2010 Subject Classification: 26B99, 33C75, 37E99.

Jordi Massó

John F. Nash's contributions to Economics: equilibrium and bargaining

John F. Nash received the Nobel Prize in Economics in 1994, together with John C. Harsanyi and Reinhard Selten, "for their pioneering analysis of equilibria in the theory of non-cooperative games", and the Abel Prize in Mathematics in 2015, together with Louis Nirenberg, "for their striking and seminal contributions to the theory of nonlinear partial differential equations and its applications to geometric analysis". This paper presents Nash's two most important contributions to Economics: the Nash equilibrium of a non-cooperative game and the Nash bargaining solution.

Keywords: non-cooperative game, Nash equilibrium, bargaining problem, Nash's bargaining solution.

MSC2010 Subject Classification: 9102, 91A05, 91A06, 91A10, 91A12.
