

THE REASONS BEHIND SOME CLASSICAL CONSTRUCTIONS IN GEOMETRY AND ANALYSIS

V.Milman (Tel Aviv University)

March 28, 2014

The talk will be devoted to two goals: to understand how some classical constructions appear (uniquely) from elementary and very simplest properties, and to build operations/algebraic relations which produce specific actions (which are well known and important in Convex Geometry and Analysis).

Instead of Introduction we start with a characterization of a very basic concepts in Convexity and Functional Analysis like Duality and the Legendre transform, Minkowski functional and others. We discuss the fact that the Legendre transform is, up to linear terms, the only involution on the class of convex lower semi-continous functions in R^n which reverses the (partial) order of functions. This leads to a different understanding of the concept of duality, which may be then apply also to many other well known settings. It is also true that any involutive transform (on this class) which exchanges summation with inf-convolution, is, up to linear terms, the Legendre transform.

We come then to the main subject of this talk to show similar phenomena in Analysis. In this spirit we will consider (and characterize) Fourier Transform, derivation, Laplace Operator, and others.

The talk will be (obviously) accessible to graduate students.