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8. Analysis

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Semigroup representations, positive definite functions and abelian C*-algebras

It is shown that every *-representation of a commutative semigroup S with involution via bounded operators on a Hilbert space has an integral representation with respect to a unique, compactly supported, selfadjoint Radon spectral measure defined on the Borel sets of the character space of S. The main feature is that the proof, which is based on the theory of positive definite functions, makes no use what-so-ever (directly or indirectly) of the theory of C*-algebras or more general Banach algebra arguments. Accordingly, this integral representation theorem is used to give a new proof of the GelfandNaimark theorem for abelian C*-algebras.