1116-AC-1278 **Julius Barbanel*** (barbanej@union.edu), Department of Mathematics, Union College, Schenectady, NY 12308. *Geometric Perspectives on Fair Division.*

We consider the following setting for fair division of a "cake" $C$: Each of $n$ players has a countably additive, non-atomic, probability measure (defined on some $\sigma$-algebra of subsets of the cake) that is used to evaluate the size of pieces of cake (i.e., subsets of $C$). Two geometric structures that arise naturally in this context are:

1. The "Individual Pieces Set" or IPS, defined by

$$\text{IPS} = \{\langle m_1(P_1), m_2(P_2), \ldots, m_n(P_n)\rangle : \langle P_1, P_2, \ldots, P_n\rangle \in \mathcal{P}\}$$

   where $\mathcal{P}$ is the set of all partitions of $C$ into $n$ measurable subsets, and

2. The "Radon-Nikodym Set" or RNS, defined by

$$\text{RNS} = \{\langle f_1(a), f_2(a), \ldots, f_n(a)\rangle : a \in C\}$$

   where $f_1, f_2, \ldots, f_n$ are the Radon-Nikodym derivatives of $m_1, m_2, \ldots, m_n$, respectively, with respect to the measure $m = m_1 + m_2 + \ldots + m_n$.

These two structures (individually and in relation to each other) provide insight into various fair division properties, such as proportionality, envy-freeness, and efficiency. (Received September 18, 2015)