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Izabella Laba and **Malabika Pramanik*** (malabika@math.ubc.ca), 1984 Mathematics Road,
Department of Mathematics, University of British Columbia, Vancouver, BC V6T 1Z2, Canada.

Multi-linear integrals associated to sparse subsets of \mathbb{R} .

We discuss two results on sparse subsets of \mathbb{R} . The first concerns existence of three term progressions and the second boundedness of maximal operators and differentiation theorems. The common theme is the estimation of certain multi-linear integrals which play a critical role in both problems. This is joint work with Izabella Laba. (Received September 19, 2009)