# Optimal Algorithms for Solution of Convex Combinations Problems

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## Abstract:

We consider the convex combinations problem (CCP), which is formulated as follows: *It is required describe the set* $\Lambda$ (**x**) *of all coefficients of convex combinations of the given points* $\{\mathbf{x}_i, i=1,...,n\} \in R^k$ *that yield the given point* $\mathbf{x} \in R^k$. Using specific of the CCP, we develop an effective method for solution this problem. In particular, the method developed is optimal with probability one. We also consider the discrete convex combinations problem (DCCP), which is formulated as follows: *It is required solve the CCP under the additional condition that the coefficients of the convex combinations take value from a given finite set.*