

COMPLETENESS IN MULTI METRIC SPACES

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Abstract: In the present paper a notion of convergence in multi metric space is presented. Complete multi metric space is introduced and some properties are studied. Cantor's intersection theorem and Banach's fixed point theorem are established in multi set settings.

Keywords and Phrases: Multi metric, iterative sequence, Cantor's intersection theorem, Banach's fixed point theorem.

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1. Introduction

Multiset (bag) is a well established notion both in mathematics and in computer science ([8], [9], [22]). In mathematics, a multiset is considered to be the generalization of a set. In classical set theory, a set is a well-defined collection of distinct objects. If repeated occurrences of any object is allowed in a set, then a mathematical structure, that is known as multiset (mset, for short), is obtained ([21], [23], [24]). In various counting arguments it is convenient to distinguish between a set like $\{a, b, c\}$ and a collection like $\{a, a, a, b, c, c\}$. The latter, if viewed as a set, will be identical to the former. However, it has some of its elements purposely listed several times. We formalize it by defining a multiset as a collection of elements, each considered with certain multiplicity. For the sake of convenience a multiset is written as $\{k_1/x_1, k_2/x_2, \dots, k_n/x_n\}$ in which the element x_i occurs k_i times. We observe that each multiplicity k_i is a positive integer.