The Converse of Kelly’s Lemma and Control-classes in Graph Reconstruction

To Professor Adriano Barlotti on the occasion of his 80th birthday

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Abstract

We prove a converse of the well-known Kelly’s Lemma. This motivates the introduction of the general notions of K-table, K-congruence and control-class.

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1 Introduction

An Ulam-subgraph of a (finite, simple, undirected, labelled) graph G of order n is a subgraph of order n − 1 obtained from G by deleting a vertex of G and the edges incident to it. Such a subgraph can also be defined as a maximal induced subgraph of G or, simply, as a subgraph induced by n − 1 vertices of G.

Thus, a graph G of order n gives rise to n distinct Ulam-subgraphs, the set of which is sometimes called the Ulam-deck of G. We shall denote by G(ν) the Ulam-subgraph of G obtained by deleting the vertex ν of G. Note that distinct Ulam-subgraphs may be isomorphic.