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

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

Paolo DULIO[1], Virgilio PANNONE[2]

[1]*Dipartimento di Matematica "F. Brioschi", Politecnico di Milano, Piazza Leonardo da Vinci 32, I-20133 Milano*
e-mail: paodul@mate.polimi.it

[2]*Dipartimento di Matematica "U. Dini", Univeristà di Firenze, Viale Morgagni 67/A, I-50134 Firenze*
e-mail: pannone@math.unifi.it

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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 $\mathcal{K}$-table, $\mathcal{K}$-congruence and control-class.

Key words: Graph; Kelly's Lemma; Reconstruction.

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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 $G^{(v)}$ the Ulam-subgraph of G obtained by deleting the vertex v of G. Note that distinct Ulam-subgraphs may be isomorphic.