ON STRONGLY CONNECTED ORIENTATIONS OF GRAPHS

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We consider finite, loopless graphs or digraphs, without multiple edges or arcs (with no pairs of opposite arcs). Let $G = (V, E)$ be a graph. A digraph $D = (V, A)$ is an orientation of $G$ if $A$ is created from $E$ by replacing every edge of $E$ by an arc in one direction.

Let $n_d$ denote the number of vertices with the degree $d$ in $G$. By the degree pair of a vertex $v \in V$ in $D$ the ordered pair $[\text{outdegree}(v), \text{indegree}(v)]$ is meant.

It is easy to see that if there exists a strongly connected orientation $D$ of a graph $G$ with pairwise different degree pairs of vertices in $D$ then in $G$ we have $n_d < d$ for every positive integer $d$.

Conjecture. Let $G$ be an undirected graph and let $n_d < d$ for every positive integer $d$. Then there exists a strongly connected orientation $D$ of $G$ with pairwise different degree pairs of vertices.