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Chen, Yong-Chuan

A short proof of Kundu's k-factor theorem. (English)

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This note gives a very short proof of the k-factor theorem due to *S. Kundu* [Discrete Math. 6, 367-376 (1973; [Zbl 0278.05115](#)): Theorem. Let $(d_1, d_2, \dots, d_n)$ and $(d_1 - k_1, d_2 - k_2, \dots, d_n - k_n)$ be two graphical sequences satisfying $k \leq k_i \leq k + 1$, $1 \leq i \leq n$, for some $k \geq 0$. Then there exists a graph $G = (V, E)$ which contains a subgraph F such that $d_G(v_i) = d_i$ and $d_F(v_i) = k_i$ for all $v_i \in \{v_1, v_2, \dots, v_n\} = V(G)$.

The above theorem was conjectured by *A. R. Rao* and *S. B. Rao* [J. Comb. Theory, Ser. B 13, 185-191 (1972; [Zbl 0224.05126](#))] for the case $k_i = k$ for all i , and independently by *B. Grünbaum* for the special case $k_i = 1$ for all i . The proof in this note readily extends to derive the generalizations of the k-factor Theorem obtained by Kundu, Kleitman and Wang, and also provides us with a simple algorithm for constructing the graph G in the theorem. The results for directed graphs may be proved similarly.

{Remark: Lemma 1 is not really necessary in the proof, but it is of some independent interest.}

Y.-C.Chen

Keywords : graphical degree sequence; graphical sequences; k-factor Theorem*Classification* :

*05C70 Factorization, etc.

Cited in ...