Spanning bipartite graphs with high degree sum
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Ore’s classic Theorem states that every graph $G = (V, E)$ of order $n \geq 3$ with $\sigma_2(G) = \min \{ \deg x + \deg y \mid x, y \in V, xy \not\in E \} \geq n$ is hamiltonian. For bipartite graphs $G = (X \cup Y, E)$ of order $2n$, Moon and Moser showed that if $\sigma_{1,1}(G) = \min \{ \deg x + \deg y \mid x \in X, y \in Y, xy \not\in E(G) \} \geq n + 1$ then $G$ is hamiltonian. Ferrara, Jacobson, and Powell later characterized the non-hamiltonian bipartite graphs where $\sigma_{1,1} \geq n$. Though the Ferrara et al. result apparently deals with a narrower class of graphs, we determine the relationship between this theorem and Ore’s Theorem.

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