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On the order of certain close to regular graphs without a matching of given size.

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Summary: A graph G is a $\{d, d+k\}$-graph, if one vertex has degree $d+k$ and the remaining vertices of G have degree d. In the special case of $k = 0$, the graph G is d-regular. Let $k, p \geq 0$ and $d, n \geq 1$ be integers such that n and p are of the same parity. If G is a connected $\{d, d+k\}$-graph of order n without a matching M of size $2|M| = n - p$, then we show in this paper the following: If $d = 2$, then $k \geq 2(p+2)$ and indent=10mm

(i) $n \geq k + p + 6$. If $d \geq 3$ is odd and t an integer with $1 \leq t \leq p + 2$, then indent=10mm

(ii) $n \geq d + k + 1$ for $k \geq d(p + 2)$,

(iii) $n \geq d(p + 3) + 2t + 1$ for $d(p + 2 - t) + t \leq k \leq d(p + 3 - t) + t - 3$,

(iv) $n \geq d(p + 3) + 2p + 7$ for $k \leq p$. If $d \geq 4$ is even, then indent=10mm

(v) $n \geq d + k + 2 - \eta$ for $k \geq d(p + 3) + p + 4 + \eta$,

(vi) $n \geq d + k + p + 2 - 2t = d(p + 4) + p + 6$ for $k = d(p + 3) + 4 + 2t$ and $p \geq 1$,

(vii) $n \geq d + k + p + 4$ for $d(p + 2) \leq k \leq d(p + 3) + 2$,

(viii) $n \geq d(p + 3) + p + 4$ for $k \leq d(p + 2) - 2$, where $0 \leq t \leq \frac{1}{2}p - 1$ and $\eta = 0$ for even p and $0 \leq t \leq \frac{1}{2}(p - 1)$ and $\eta = 1$ for odd p.

Keywords: matching; maximum matching; close to regular graph
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