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ON THE EXISTENCE OF SPECIFIC STARS IN PLANAR GRAPHS

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Given a graph G, a $(k; a, b, c)$-star in G is a subgraph isomorphic to a star $K_{1,3}$ with a central vertex of degree k and three leaves of degrees a, b and c in G.
The main result of the paper is:
Every planar graph G of minimum degree at least 3 contains a $(k; a, b, c)$-star with $a \leq b \leq c$ and (i) $k = 3$, $a \leq 10$, or (ii) $k = 4$, $a = 4$, $4 \leq b \leq 10$, or (iii) $k = 4$, $a = 5$, $5 \leq b \leq 9$, or (iv) $k = 4$, $6 \leq a \leq 7$, $6 \leq b \leq 8$, or (v) $k = 5$, $4 \leq a \leq 5$, $5 \leq b \leq 6$ and $5 \leq c \leq 7$, or (vi) $k = 5$ and $a = b = c = 6$.
Our result is in some cases best possible and in the remaining ones it differs by at most one from the optimum.