

## Skewness, Colorings and Cliques

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The skewness  $\mu(G)$  of a simple graph  $G = (V, E)$  is the minimum number of edges whose removal makes the graph planar. Our main result states that among all graphs requiring  $n$  colors, the complete graph on  $n$  vertices  $K_n$  is the one with the smallest skewness, i.e. if  $\chi(G) \geq n$  then  $\mu(G) \geq \mu(K_n)$ , where  $\chi(G)$  is the chromatic number of  $G$ . When  $n = 5$  the statement is equivalent to the Four Color Theorem. When  $n = 6$  the statement is equivalent to a generalization of the Five Color Theorem by Kainen. We provide an elementary proof when  $n \geq 7$ . We also discuss a corresponding conjecture by Albertson where the skewness is replaced by the crossing number.

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