Title: Some characterizations of $L_9(2)$ related to its prime graph

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Let G be a finite group. The prime graph of G is denoted by $\Gamma(G)$. In this paper as the main result we determine finite groups G such that $\Gamma(G) = \Gamma(L_9(2))$. Let $\pi_e(G)$ be the set of element orders of G, which is called the spectrum of G. Denote by $h(G)$ the number of isomorphism classes of finite groups H satisfying $\pi_e(H) = \pi_e(G)$. It is proved that some finite groups are uniquely determined by their spectrum, i.e. $h(G) = 1$. As a consequence of our result we prove that the simple group $L_9(2)$ is uniquely determined by its spectrum. The degree pattern of a finite group is denoted by $D(G)$. At last we prove that if G is a finite group such that $|G| = |L_9(2)|$ and $D(G) = D(L_9(2))$, then $G \cong L_9(2)$.

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