On chromatic functors and stable partitions of graphs

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Abstract. The chromatic functor of a simple graph is a functorization of the chromatic polynomial. M. Yoshinaga showed that two finite graphs have isomorphic chromatic functors if and only if they have the same chromatic polynomial. The key ingredient in the proof is the use of stable partitions of graphs. The latter is shown to be closely related to chromatic functors. In this note, we further investigate some interesting properties of chromatic functors associated to simple graphs using stable partitions. Our first result is the determination of the group of natural automorphisms of the chromatic functor, which is in general a larger group than the automorphism group of the graph. The second result is that the composition of the chromatic functor associated to a finite graph restricted to the category FI of finite sets and injections with the free functor into the category of complex vector spaces yields a consistent sequence of representations of symmetric groups which is representation stable in the sense of Church-Farb.