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**Krishna B Thapa magar\*** (kthapama@fau.edu), 777 Glades Road, Boca Raton, FL 33486, and **Spyros S Magliveras**. *Construction of Hoffman-Singleton graph using a well known peculiarity of  $\mathbb{A}_6$ .*

The Hoffman-Singleton graph  $H$ , a member of the small family of Moore graphs of diameter 2, is a well known 7-regular undirected graph with 50 vertices and 175 edges. We construct  $H$  as a rank 3 graph with subdegrees  $(1, k=7$  and  $l=42)$ , using the alternating group  $A_7$ . There are 63 distinct  $A_5$ 's in  $A_7$  which fall into exactly two conjugacy classes of subgroups of sizes 21 and 42. An  $A_5$  of the first class of size 21 fixes two points, whereas an  $A_5$  of the second class of size 42 fixes one point and acts transitively on the remaining 6 points. We use the 42  $A_5$ 's of the second class to construct the Hoffman-Singleton graph. This construction is possible because  $S_6$  is the only member of the family of symmetric groups  $S_n$  to possess outer-automorphisms.

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