Combinatorics Seminar

Wednesday March 4th, 2015

3:50 pm-4:50 pm in Hume 201

Moore Graphs of Diameter two: The Hoffman-Singleton Problem

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ABSTRACT A k-regular graph G of diameter not exceeding two is easily seen to have at most $n = 1 + k^2$ vertices. If G has exactly $1 + k^2$ vertices, it is said to be a Moore Graph. K_1, K_2, C_5 and the Petersen Graph are Moore Graphs with $k = 0, 1, 2, 3$.

Homan and Singleton displayed, in 1960, a Moore Graph with $k = 7$ and they proved that if there is another it must be with $k = 57$. Their lovely proof uses eigenvalues of the adjacency matrix.

I will show the Homan-Singleton proof and then discuss observations by Siemion Fajtlowicz and Bing Wei which may prove useful in constructing the putative Moore graph with $k = 57$ and $n = 3250$: