1113-05-117 **Franklin H. J. Kenter*** (`franklin.h.kenter@rice.edu`). *Spectral Results for Adaptations of Graph Coloring.*

Hoffman proved that for a simple graph G, the chromatic number, $\chi(G)$, obeys $\chi(G) \leq 1 - \lambda_{\max}/\lambda_{\min}$ where $\lambda_{\max}$ and $\lambda_{\min}$ are the maximal and minimal eigenvalues of the adjacency matrix of G respectively.

We give a short probabilistic proof of Hoffman's theorem, Then, we extend the technique to variations of graph coloring with additional restrictions and/or relaxations. Our results include necessary spectral conditions for coloring 3-, 4-, and 5-uniform hypergraphs; for coloring graphs limiting the use of colorings with a neighborhood (i.e., frugal coloring); and coloring directed graphs where no color class is a strongly connected component. (Received August 16, 2015)