1135-05-258 **Sam Spiro*** (sspiro@ucsd.edu). *Polynomial Relations of Matrices of Graphs.*

Let A_G and L_G denote the adjacency matrix and Laplacian matrix of the graph G. If G is d-regular, then $A_G = dI - L_G$, and it is easy to use this relationship to translate from eigenvalues of A_G to eigenvalues of L_G, and vice versa. If G is (d_1, d_2)-regular, then $A_G^2 = (L_G - d_1 I)(L_G - d_2 I)$. Remarkably, it also turns out that this relationship allows one to translate between the eigenvalues of A_G and L_G.

Given these results, it is natural to ask which graphs G have the property that there exists a polynomial f and positive integer r such that $A_G^r = f(L_G)$. In this talk we shall prove that the only graphs with this property are the regular and biregular graphs. We shall also briefly discuss more general relations of the form $f(A_G) = g(L_G)$ for polynomials f and g, and relations involving the signless and normalized Laplacian of a graph. (Received September 25, 2017)