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C I Vinsonhaler* (vinsonhaler@math.uconn.edu), Department of Mathematics Unit 3009, University of Connecticut, Storrs, CT 06269. *Approximately Simultaneously Diagonalizable Matrices.*

A collection A_1, A_2, \dots, A_k of n by n commuting matrices over the complex numbers has the ASD property if the matrices can be perturbed by an arbitrarily small amount so that they become simultaneously diagonalizable. We give a direct matrix proof that the ASD property holds for three commuting matrices if one of them is 2-regular (dimension of eigenspaces is at most 2). Corollaries include results of Gerstenhaber and Neubauer-Sethuraman on bounds for the dimension of the subalgebra generated by the A_i . Even if the ASD property fails, we can obtain bounds on this dimension when one of the matrices is 2-regular. One offshoot of our work is a new canonical form, the H-form, for matrices over an algebraically closed field. The H-form is a sparse, Jordan-like, upper triangular matrix that allows us to assume that any commuting matrices are upper triangular. (The Jordan form does not accommodate this.) Our study was motivated by a question from mathematical biology. (Received August 27, 2005)