

1079-05-380

Nathaniel Dean* (nd17@txstate.edu), Department of Mathematics, 601 University Drive, San Marcos, TX 78666, and **Jonathan Berry, Bob Carr, Jill A Cochran, Susan Morey, Cynthia A Phillips** and **Brigitte Servatius**. *Small Unit Distance Graphs*. Preliminary report.

A graph is a unit distance graph if it can be drawn in the plane so that the distance between any pair of adjacent vertices equals one. A unit distance graph is maximal if the addition of any edge results in a graph which is not a unit distance graph. Let $u(n)$ and $U(n)$ denote the minimum and maximum number of edges in a maximal unit-distance graph of order n . Based on the asymptotic results of Erdős (1946) and Spencer, Szemerédi and Trotter (1984), finding a formula for $u(n)$ and $U(n)$ seems difficult, and further very little is known even for small n . The exact values are known for $n \leq 7$. We show through proofs and computing (i.e., graph theory, algebraic geometry, combinatorics, optimization, etc.) that $u(8) = 12$, $U(8) = 14$, and we determine all maximal unit distance graphs of order eight. (Received January 18, 2012)