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Eric M. Hanson* (hanson@math.colostate.edu), Department of Mathematics, 1874 Campus Delivery, Fort Collins, CO 80525. *Unit Distance Embeddings of Graphs via Numerical Algebraic Geometry.*

A unit-distance graph is a graph that can be embedded in \mathbb{R}^2 with unit length edges. Suppose (x_i, y_i) and (x_j, y_j) are adjacent vertices in a graph, then in order for the graph to be a unit-distance graph $(x_i - x_j)^2 + (y_i - y_j)^2 - 1 = 0$ for all adjacent vertices. With these equations, techniques from numerical algebraic geometry can be used to test if a graph has a unit-distance embedding. In particular, we consider the Heawood Graph, which is known to have 11 unit-distance embeddings (Gerbracht). We show that there are in fact infinitely many unit-distance embeddings. Since the Heawood Graph is the point-line incidence graph of the Fano Plane, our results further disprove Chvátal's conjecture that all point line incidence graphs of finite projective planes are not unit-distance graphs. (Received September 16, 2014)