Eric A. Swartz* (eswartz@math.ohio-state.edu), Department of Mathematics, The Ohio State University, 231 West 18th Avenue, Columbus, OH 43202. A Construction of an Infinite Family of 2-Arc Transitive Polygonal Graphs of Arbitrary Odd Girth.

A near-polygonal graph is a graph $\Gamma$ which has a set $C$ of $m$-cycles for some positive integer $m$ such that each 2-path of $\Gamma$ is contained in exactly one cycle in $C$. If $m$ is the girth of $\Gamma$ then the graph is called polygonal. Up until now, the only examples of 2-arc transitive polygonal graphs with arbitrarily large valency had girth no larger than seven, and the 2-arc transitive polygonal graph with largest girth had valency five and girth twenty-three (in fact, even with no restrictions on the automorphism group, there were no examples of polygonal graphs with odd girth greater than twenty-three). We provide a construction of an infinite family of polygonal graphs of arbitrary odd girth with 2-arc transitive automorphism groups. (Received January 29, 2009)