1123-05-404 **David S. Gunderson*** (david.gunderson@umanitoba.ca), Department of Mathematics, 521 Machray Hall, 186 Dysart Road, Winnipeg, Manitoba R3T 2N2, Canada. *Extremal graphs forbidding an odd cycle.*

For a positive integer $n$ and a simple graph $F$, the extremal number $\mathrm{ex}(n;F)$ is the maximum number of edges in any $n$-vertex $F$-free graph. An extremal graph for $F$ is an $F$-free graph on $n$ vertices with $\mathrm{ex}(n;F)$ edges.

Mantel's theorem for forbidding triangles says that $\mathrm{ex}(n;C_3) = \lfloor n^2/4 \rfloor$, and the complete bipartite $K_{\lfloor n/2 \rfloor, \lceil n/2 \rceil}$ is the unique extremal graph. One might guess that since $K_{\lfloor n/2 \rfloor, \lceil n/2 \rceil}$ is a maximal graph with no odd cycles, it is also the unique extremal graph for any other odd cycle as well. In 1968, Simonovits showed that indeed this is true, but only for sufficiently large $n$. In the 1970s, Bondy and Woodall showed that for $n \geq 4k-1$, $\mathrm{ex}(n;C_{2k+1}) = \lfloor n^2/4 \rfloor$, but without finding the extremal graphs.

In recent work with Furedi, for each $k \geq 2$ and for all $n$, we find the extremal number $\mathrm{ex}(n;C_{2k+1})$ together with all extremal graphs. For some values of $k$ and $n$, there are three extremal graphs. (Received August 30, 2016)