▶ **Problem DM-6.6-18** Prove that if a graph G has an n-circuit with n odd and $n > 3$, then G has an odd cycle.

Proof. Let $\mathscr{C}$ be an n-circuit in a graph G with n odd and $n > 3$. From definition, we know that $\mathscr{C}$ contains at least one cycle as its subgraph. Furthermore, $\mathscr{C}$ can be partitioned into a sequence of edge-disjoint cycles. Let $C_1, C_2, \ldots, C_k$ be such a sequence of cycles. Since $|\mathscr{C}| = |C_1| + |C_2| + \cdots + |C_k| = n$ is odd, it guarantees that at least one cycle C_i, $1 \leq i \leq k$, must have odd length. □