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A seminal result of Whitney characterizes when two graphs have the same set of cycles (where cycles are viewed as sets of edges). Namely, two graphs have the same cycle if and only if one can be obtained from the other by repeatedly rearranging the graph along one- and two-vertex cutsets. We are interested in characterizing when two graphs have the same set of even cycles (a cycle is even if it contains an even number of edges). We can give a Whitney type theorem for the case where the graphs have high connectivity or for the case where they contain a sufficient number of pairwise disjoint odd cycles.

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