The Theory of Computation
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Addison-Wesley-Longman, 1998

Solution Manual
Chapter 2, Problem 2.16

We prove the result indirectly, by proving that the sum of all node degrees is even. It then follows immediately that the number of nodes of odd degree must be even.

The sum of the degrees of the nodes is even because it is exactly twice the number of edges of the graph: each edge contributes a value of 1 to exactly two nodes' degrees and thus contributes exactly 2 to the sum of all node degrees.