The Theory of Computation
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Solution Manual
Chapter 7, Problem 7.9

Let Π be some NP-complete problem and assume that Π also belongs to coNP. We want to show that NP must be closed under complementation. Let Π' be any other problem in NP; since Π is NP-complete, there exists a polynomial-time reduction f mapping Π' to Π. The same transformation f reduces in polynomial time the complement of Π' to the complement of Π. But Π is in coNP, so that its complement is in NP; hence we have a polynomial-time reduction from the complement of Π' to a problem in NP. Thus the complement of Π' is in NP (see Exercise 6.8), so that NP is closed under complementation, as was to be proved.