

# 15-251: Great Theoretical Ideas In Computer Science

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## Recitation 7

### Almost the Same

Recall that an independent set of vertices in a graph is a set such that no pair are adjacent. We define the INDEPENDENT-SET problem to be the problem of checking if there exists an independent set of size  $k$ . Prove INDEPENDENT-SET is NP-COMPLETE by reducing CLIQUE to it.

### Your Covering is Satisfactory

Prove that VERTEX-COVER is NP-HARD, by reducing 3-SAT to it.

### Not a Graph Problem

Prove that SUBSET-SUM, the problem of given  $n$  numbers, is there some subset that sums to  $k$  (we allow duplicate numbers), is NP-COMPLETE.

### HALTS is HARD

Prove that the Halting Problem is NP-HARD.