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# Syracuse University – CIS 675 Winter 2020

# 8.4.2 3/9/2020

To reduce vertex cover to independent set, we will consider graph G. The vertex cover is set S, and the independent set is all nodes not in S, or S’. Every edge is adjacent to at least one of the nodes in S. If nodes u and v were in the independent set, then that would mean neither u nor v was in the vertex cover. But if that were true, then their edge would also not be in the vertex cover, which would invalidate the vertex cover. Thus, nodes u and v are not in the independent set, and if we have found the smallest possible vertex cover, then we have found the largest possible independent set.

1. Validating the edge between u and v is in polynomial time
2. We can recover our solution in polynomial time as well by determining where u and v are
3. By finding the smallest vertex cover, then we have found the largest independent set (because know which vertices are and are not in S)
4. If we have found the largest independent set, then we have also found the smallest vertex cover (by the nodes that are not in S’)