- (1a) Yes. One solution would be: Interval Scheduling can be solved in polynomial time, and so it can also be solved in polynomial time with access to a black box for Vertex Cover. (It need never call the black box.) Another solution would be: Interval Scheduling is in NP, and anything in NP can be reduced to Vertex Cover. A third solution would be: we've seen in the book the reductions Interval Scheduling  $\leq_P$  Independent Set and Independent Set  $\leq_P$  Vertex Cover, so the result follows by transitivity.
- (1b) This is equivalent to whether P = NP. If P = NP, then Independent Set can be solved in polynomial time, and so Independent Set  $\leq_P$  Interval Scheduling. Conversely, if Independent Set  $\leq_P$  Interval Scheduling, then since Interval Scheduling can be solved in polynomial time, so could Independent Set. But Independent Set is NP-complete, so solving it in polynomial time would imply P = NP.

 $<sup>^{1}</sup>$ ex370.181.361