# Homework 4
## Due Fri Apr 18, 5:00pm

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**General Instructions:** Same as in Homework 1.
**Honor Principle:** Same as in Homework 1.

8. The complexity class DP is defined as follows:

$$\mathsf{DP} \;=\; \{L_1 \cap L_2 : \; L_1 \in \mathsf{NP} \text{ and } L_2 \in \mathsf{coNP}\}\,.$$

Prove that the language EXACT-IND-SET $= \{\langle G, k\rangle : \; G$ is a graph with $\alpha(G) = k\}$ is DP-complete under polynomial time reductions. Here, $\alpha(G)$ is the independence number of $G$, defined as the size of a maximum independent set of $G$. [2 points]

9. Locate DP within the polynomial hierarchy, i.e., determine its relation to the classes $\Sigma_i^p$ and $\Pi_i^p$, as best as you can. See if you can say anything more by assuming that the hierarchy does not collapse. [2 points]