

4. Rooms that have always been used to teach courses by either CS professors or combinatorics and optimization (CO) professors.

$$\begin{aligned}
 & \{ z \mid \exists u, v, w, x, y . \text{schedule}(u, v, w, x, y, z) \\
 & \quad \wedge \exists q, r, s, t . \text{class}(u, v, w, q) \\
 & \quad \wedge \text{professor}(q, r, s, t) \\
 & \quad \wedge (t = \text{"CS"} \vee t = \text{"CO"}) \\
 & \quad \wedge \\
 & \quad \neg (\exists u1, v1, w1, x1, y1 . \text{schedule}(u1, v1, w1, x1, y1, z) \\
 & \quad \quad \wedge \exists q1, r1, s1, t1 . \text{class}(u1, v1, w1, q1) \\
 & \quad \quad \wedge \text{professor}(q1, r1, s1, t1) \\
 & \quad \quad \wedge (\neg t1 = \text{"CS"} \vee \neg t1 = \text{"CO"}) \\
 & \quad) \\
 & \}
 \end{aligned}$$