System Specification and Verification
- Seminar - Week 6 -

Spring 2026

1. Build one non-deterministic Büchi word automaton for the following formulas:
   - $\varphi_1 = \neg(GFb)$
   - $\varphi_2 = G(p \rightarrow X(q\mathcal{U}r))$
   - $\varphi_3 = (G(p \rightarrow q)) \rightarrow G\alpha$ where $\alpha = F(p \wedge Xp)$.
   - $\varphi_4 = \neg(a\mathcal{U}X(a \wedge \neg b))$

   i Write the formula in negative normal form

   ii Draw the reduction graph starting from φ.

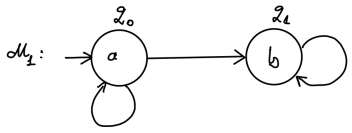
   iii Give the sets $Red(\{\varphi\})$ and $Red_\alpha(\{\varphi\})$.

   iv Draw the transitions starting from state $\{\varphi\}$ in the GBA $\mathcal{B}_\varphi$.

   v Complete the construction and draw the automaton $\mathcal{B}_\varphi$.
   Indicate clearly the accepting conditions.

   vi Compute the non-deterministic Büchi automaton $\mathcal{A}_\varphi$.

2. Verify if the below transition system satisfies GFb.



Then verify the following transition system for the same specificarion: