

# Propositional logic - lab exercises

Computational Logic

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## 1 BDDs

- (a) Express the main connectives in terms of the if-then-else construct  $\succrightarrow$ , top ( $\top$ ), and bottom ( $\perp$ ).

Example:  $\neg p$  is rewritten as  $p \succrightarrow \perp, \top$

- (b) Rewrite the following formula in if-then-else normal form and then represent it as a binary decision tree ( $p_1 \leftrightarrow q_1 \wedge (p_2 \leftrightarrow q_2)$ )

- (c) Consider the CNF formula

$$F = \{\{p, q, \neg r, t\}, \{p, \neg q, t\}, \{\neg t\}, \{r\}, \{s\}\}$$

Use BDDs to show that  $p$  follows from  $F$ .

## 2 Resolution

- Solve (c) using resolution.
- Show that resolution is *not* complete in the standard sense.

## 3 DPLL

- Solve (c) using DPLL.
- Prove soundness of the splitting rule.

## 4 Tableaux

- Solve (c) using tableaux.