

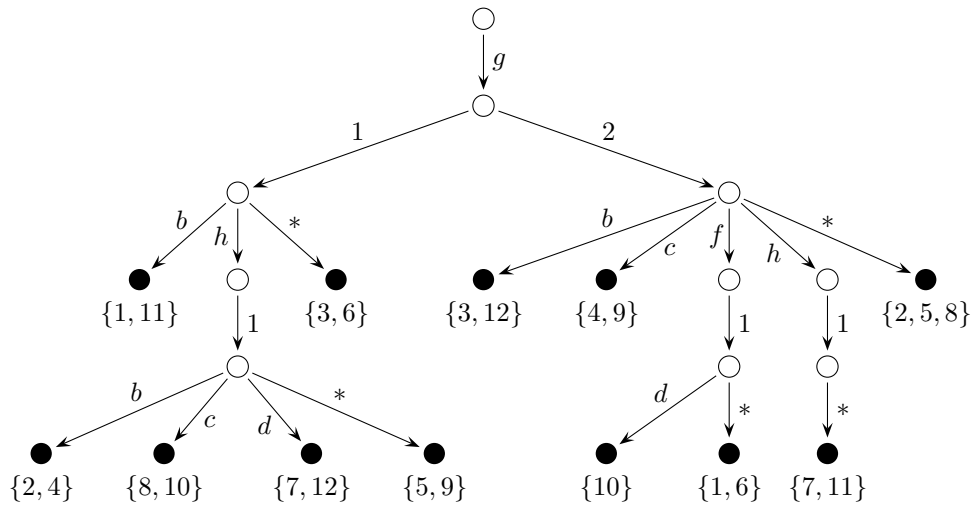
# Automated Theorem Proving

Prof. Dr. Jasmin Blanchette, Yiming Xu, PhD,  
Tanguy Bozec, and Lydia Kondylidou  
based on exercises by Dr. Uwe Waldmann

Winter Term 2025/26

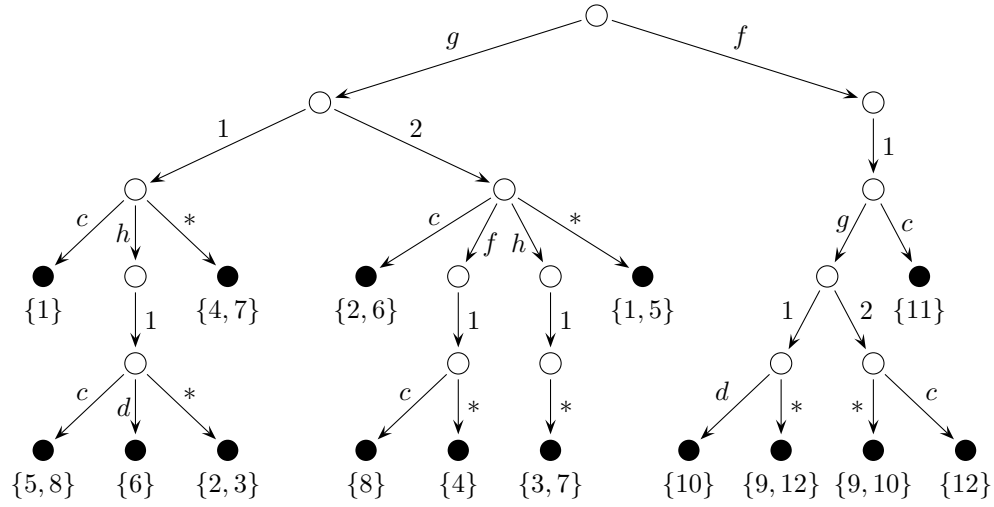
## Exercises 14: Efficient Saturation Procedures and Outlook

**Exercise 14.1:** Consider the following path index:



Does path index contain the terms  $t_1 = g(h(d), h(*))$ ,  $t_2 = g(h(b), c)$ ,  $t_3 = g(*, *)$ ? If yes, what are their numbers in the index?

**Exercise 14.2:** Consider the following path index:



- (a) Which terms have the numbers 3, 5, and 12 in the path index?
- (b) Which of the terms  $g(*, h(*))$ ,  $f(g(d, c))$ , and  $g(h(*), c)$  are contained in the path index? If they are contained, what are their numbers?
- (c) Assume that the terms in the path index are the left-hand sides of the rewrite rules of a TRS  $R$ . Is the term  $f(g(h(d), f(c)))$  reducible by rules in  $R$ ? If yes, what are the numbers of the left-hand sides of these rules?

**Exercise 14.3:** Could one use the following numbers as features in a feature vector index?

- (1) the number of ground arguments of predicate symbols in a clause,
- (2) the number of variable occurrences in a clause,
- (3) the number of constant symbols occurring in positive literals in a clause,
- (4) the number of literals in a clause that do not contain variables,
- (5) the number of literals in a clause that do not contain the function symbol  $f$ ,
- (6) the number of literals in a clause that do not contain the predicate symbol  $P$ ,
- (7) the number of literals in a clause that contain neither variables nor the function symbol  $f$ ,
- (8) the number of distinct variables in a clause.