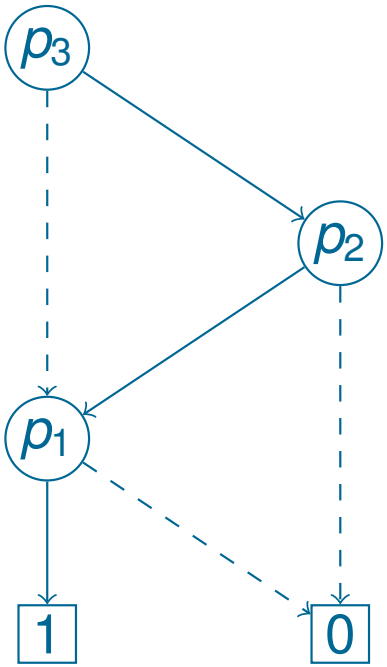
Exercise 6. Problem 1

Compute the OBDD for the formula $\neg(p_1 \wedge p_2) \rightarrow (p_1 \vee p_3)$ and the order $p_3 > p_2 > p_1$.

Solution



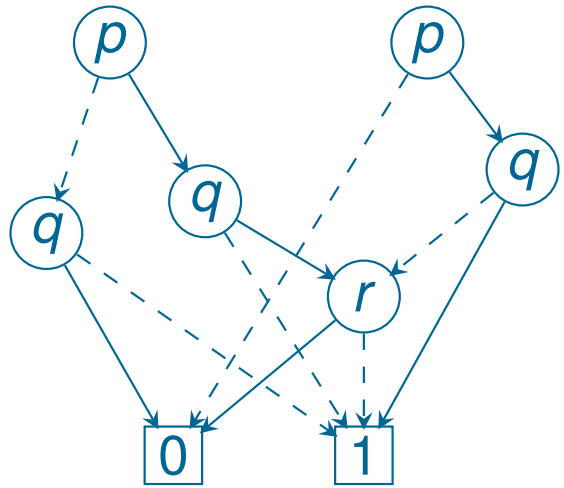
Typical Errors

In general, most solutions first build a BDT and then transform it into an OBDD. This is not an error, but I defined an algorithm for building an OBDD directly from the formula.

- Mistakes in building the BDT (wrong splitting/simplifications).
- Some give as a solution a BDT containing redundant tests and/or isomorphic subdags.
- Use of a wrong order.
- Some give dags with several top nodes as a solution.

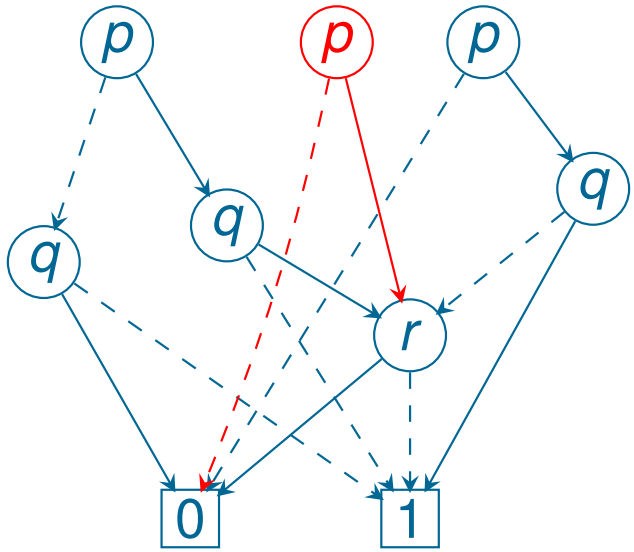
Exercise 6. Problem 2

Consider the following global dag D.



It has two different subdags d_1, d_2 rooted at p. Let d_1, d_2 represent formulas F_1, F_2, respectively. Draw the global dag D after the OBDD for $F_1 \wedge F_2$ has been integrated into it.

Solution



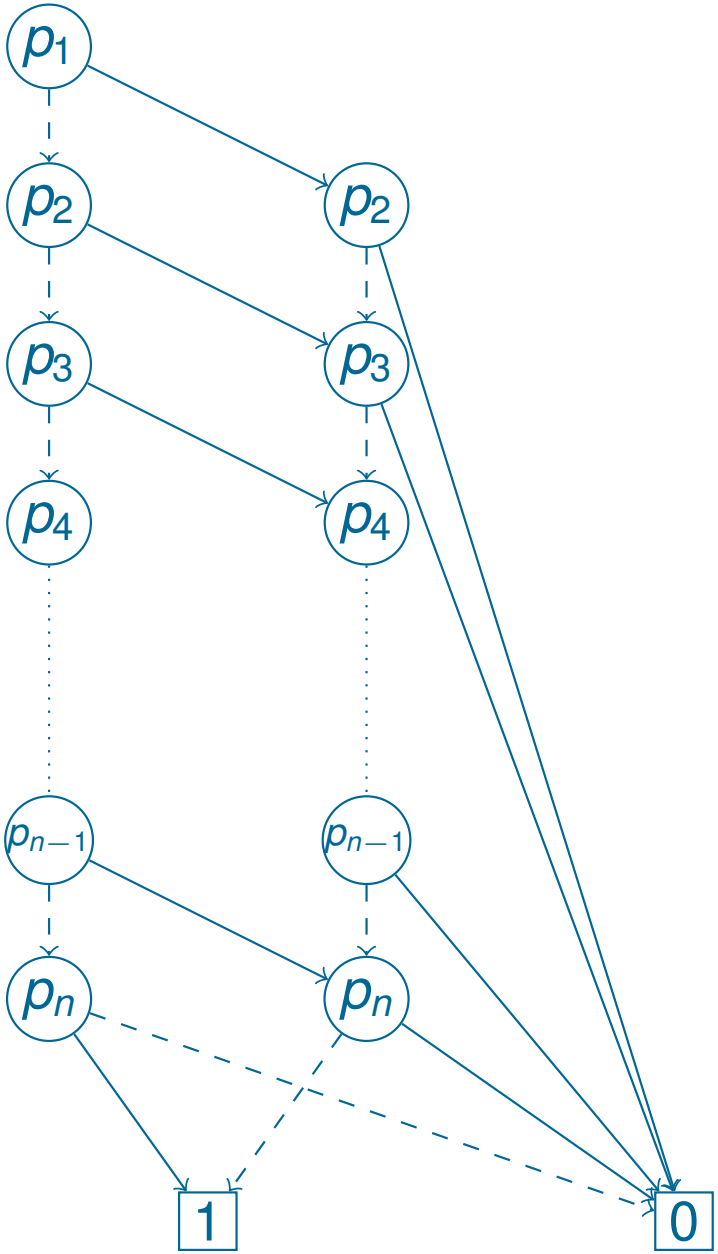
Typical Errors

- Many do not know how to computing the OBDD for a conjuction. Some build truth tables and then compute the OBDD: this is not an error but a very long way to a solution.
- Some solutions build formulas F_1 and F_2 corresponding to the two dags rooted at p and integrate/merge OBDDs F_1 and F_2. Obviously, the result in this case would be the initial global dag.

Exercise 6. Problem 3

A propositional formula F of variables $p_1, \ldots, p_n$ is true in an interpretation I if and only if exactly one atom from $p_1, \ldots, p_n$ is true in I. Draw the OBDD for F and the order $p_1 > p_2 > \ldots$.

Solution



Typical Errors

- A few solutions give an OBDDs for a formula with at least one variable being true, instead of exactly one.
- Many solutions draw nodes with a loop, but OBDDs are acyclic.