

$$p(a)$$

and we have the goal

$$p(X) \rightarrow$$

Actually, we want to know whether there is a value for which p is true. We expect a positive answer because of the fact $p(a)$. Thus $p(X)$ is existentially quantified. But then why do we negate the formula? The explanation is that we use a proof technique from mathematics called *proof by contradiction*. This technique proves that a statement A follows from a statement B by assuming that A is false and deriving a contradiction when combined with B . Then A *must* follow from B .

In logic programming we prove that a goal can be answered positively by negating the goal and proving that we get a contradiction using the logic program. For example, given the logic program

$$p(a)$$

and the goal

$$\neg \exists X p(X)$$

we get a logical contradiction: the second formula says that no element has the property p , but the first formula says that the value of a does have the property p . Thus $\exists X p(X)$ follows from $p(a)$.

5.4 Monotonic Rules: Semantics

5.4.1 Predicate Logic Semantics

One way of answering a query is to use the predicate logic interpretation of rules, facts, and queries, and to make use of the well-known semantics of predicate logic. To be more precise, given a logic program P and a query