ProLog

Basic structures

- names
  - valid characters in names include most any on a keyboard; a name can even contain a space, if the entire name is enclosed in quotation marks.
  - names *beginning* with an upper-case letter or an underscore are reserved for variables
  - *atoms* (or constants) include words beginning with a lower-case letters used in isolation.
  - *predicates* (procedures) include words beginning with a lower-case letters and requiring (as indicated by parentheses) inputs.
- **Conditionals**: if p then q is coded as $q :- p$.
- **Conjunctions**: $p \wedge q$ is coded as p, q.
  Together, the code
  $$r :- p, q$$
  means $p \wedge q \to r$.
- **Disjunctions**: $p \vee q$ is coded as $p; q$.

Other important items:

- *Program* files, often referred to as "knowledge bases", can be created separately using a text editor.
- Commands in prolog end with a period (.) character.
- Sample rules:

  `husband(luke, mara) :- wife(mara, luke).`
  expresses wife(mara,luke) $\to$ husband(luke,mara)
  modus ponens

  `ownsLightSaber(X) :- jedi(X).`
  expresses $\forall X(\text{jedi}(X) \to \text{ownsLightSaber}(X))$

  `husband(X, Y) :- wife(Y, X).`
  expresses $\forall X \forall Y(\text{wife}(Y, X) \to \text{husband}(X, Y))$

- Sample queries:

  `jedi(dooku).`
  evaluates as True since this is a fact in the knowledge base.

  `master(sidious, X).`
  expresses "Is $\exists X$ for which master(sidious,X) is true?" All instances are listed.

Practice

1. Write queries for
   (a) whether luke is a child of leia.
   (b) all children of leia.
   (c) all sons of leia.
   (d) all uncles of jacen.
   (e) all grandchildren of anakin
   (f) all names of "force-sensitive" characters (whether sith or jedi)
   (g) all names of characters who are both sith and jedi
2. Write rules for
   (a) mother(X), so that the mother of X is sought/found
   (b) nephew(X)
   (c) isForceSensitive(X)
   (d) isForceSensitive(X)
   (e) grandfather(X)
3. Add information to the knowledge base so that there is a person named owen who appears in response to the query `uncle(luke)`.