

INST0072: Exercises for Lecture 5

Exercise 5-1

For each of the following pairs of terms, state whether they match or not. If they match, write down their most general unifier.

1. `father(X,eric)`
 `father(friend_of(sam),Y)`
2. `father(X,eric)`
 `father(friend_of(sam),X)`
3. `father(X,Y)`
 `father(Z,sue)`
4. `father(X,eric)`
 `grandfather(Y,Z)`
5. `father(friend_of(friend_of(sue)),Y)`
 `father(friend_of(X),eric)`
6. `passes_through(line_joining(X,Y),midpoint_of(A,B))`
 `passes_through(N,midpoint_of(c,d))`

[[Answer](#)]

Exercise 5-2

When the example answer to Exercise 2-2 [[view](#) | [download](#)] is run with the query `son(X,Y)` the first two answers it gives are identical:

```
?- son(X, Y).  
X = rob,  
Y = geoffrey ;  
X = rob,  
Y = geoffrey .
```

Draw the first part of the search tree for the query `son(X,Y)` to explain why this is so.

[[Answer](#)]

Exercise 5-3

Draw a search tree for the following program

```
happy(X) :-  
    healthy(X),  
    rich(X).  
happy(X) :-  
    healthy(X),  
    friend(X, Y),  
    rich(Y).  
  
healthy(rob).  
healthy(sally).  
healthy(jim).  
  
rich(sally).  
rich(eric).  
  
friend(jim, eric).
```

with the query '?- happy(X)'. Run this query in SWI Prolog, using the trace facility to see how Prolog does a search of the search tree you have drawn.

[[Download Program](#) | [Answer](#)]

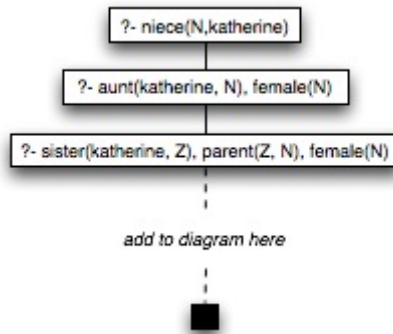
Exercise 5-4

Remove the three 'healthy(...)' facts from the program in question 2-3 and instead add a rule that expresses that a person is healthy if (s)he takes exercise and eats well. The add facts to express that rob and jim take exercise, and sally and jim eat well. Draw the search tree for the query '?- happy(X)' with the new program, and then trace the execution of the query with the SWI Prolog trace facility.

[[View Example Solution](#) | [Download Example Solution](#) | [Search Tree](#)]

Exercise 5-5

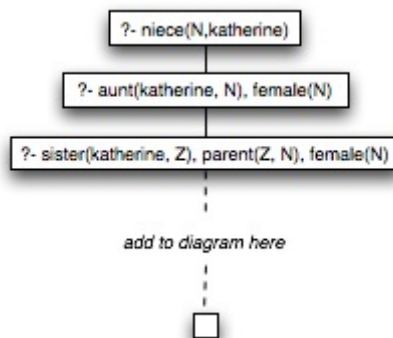
Run the example answer to Exercise 2-2 [[view](#) | [download](#)] with the query 'niece(N,katherine)'. Complete the following diagram of the left-most (fail) branch of the search tree for this query. (You will need a large piece of paper.)



[[Answer](#)]

Exercise 5-6

Run the [example answer to Exercise 2-2](#) with the query 'niece(N,katherine)'. Complete the following diagram of the (successful) branch of the search tree for this query that results in the solution 'N=rebecca'. (You will need a large piece of paper.)



[[Answer](#)]

Page maintained by [Rob Miller](#). Last updated: 3/10/2019.