

Finals (25 pts)

1 List Processing

6 pts

Write a Prolog program that enumerates all the subsets of a set (represented as a list) on backtracking.
Now write a query that generates the powerset of a set.

2 Using Operators

4 pts

Fully parenthesize the following terms based on the precedence and associativity information given below :

`op(1200,xfx, :-)` `op(1100,xfy, ;)` `op(1050,xfy, ->)` `op(1000,xfy, ',')`

`p :- q -> r, s ; t.`

`p :- q, r -> s ; t.`

To improve readability, display the result as an abstract syntax tree.

3 Procedural Meaning and Cuts

10 pts

```
p(a,b).
p(X,Z) :- q(X,Y),!,r(X,Z).
p(c,d).
q(a,b).
q(b,c).
r(b,c).
r(b,d).
s(X,Y) :- q(X,Y).
s(X,Y) :- q(X,Z),s(Z,Y).
t(X,Y) :- q(X,Z), \+ t(Z,Y).
```

Describe *all* the solutions output by the Prolog interpreter for the following queries:

1. `p(X,Y).`
2. `p(b,Y).`
3. `s(X,Y).`
4. `t(a,b).`

4 Programming Paradigms

5 pts

Motivate/explain the benefits of logic programming paradigm over other programming paradigms by providing an illustrative example/application.