CSE320 Lab Report .Prolog

Result for quicksort

```
?- tquicksort([10,80,30,90,40,50,70], Sorted).
        Start time:     1583989895.4844613
        End time:       1583989895.4845262
        Finish Time:    6.4849853515625e-5
Sorted = [10, 30, 40, 50, 70, 80, 90].

?- tquicksort([11,22,44,33,77,66,55,99], Sorted).
        Start time:     1583989993.3335588
        End time:       1583989993.3335989
        Finish Time:    4.00543212890625e-5
Sorted = [11, 22, 33, 44, 55, 66, 77, 99].

?- tquicksort([112,28,81,198,92,466,58,597,46,989], Sorted).
        Start time:     1583990116.4862328
        End time:       1583990116.4863071
        Finish Time:    7.43865966796875e-5
Sorted = [28, 46, 58, 81, 92, 112, 198, 466, 597|...].

?- tquicksort([222,444,587,456,455,678,716,729,782,239,195,495,794,309,988], Sorted).
        Start time:     1583990208.25937
        End time:       1583990208.2594233
        Finish Time:    5.316734313964844e-5
Sorted = [195, 222, 239, 309, 444, 455, 456, 495, 587|...].

?-
```

Result for Partition

```
Please run ?- license. for legal details.

For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- [partiprolog].
true.

?- tpa([11 44 23 56 67 85 56 76 54],L,R).
        Start time:     1584319866.016151
false.

?- tpa([1 2 3], L, R).
        Start time:     1584319891.636516
false.

?- tpa([1,2,3,4,5,6,7],L,R).
        Start time:     1584319936.0704107
        End time:       1584319936.0705457
        Finish Time:    0.00013494491577148438
L = [1, 2, 4, 7],
R = [3, 5, 6].
```

Source code

```
tquicksort(X, Y) :-
  get_time(St),
  write("\tStart time: \t"), write(St), nl,
  quicksort(X, Y),
  get_time(Et),
  write("\tEnd time: \t"), write(Et), nl,
  Ft is Et-St,
  write("\tFinish Time: \t"), writeln(Ft)->true.

quicksort([X|Xs],Ys) :-
  partition(Xs,X,Left,Right),
  quicksort(Left,Ls),
  quicksort(Right,Rs),
  append(Ls,[X|Rs],Ys).
quicksort([],[]).

partition([X|Xs],Y,[X|Ls],Rs) :-
  X =< Y, partition(Xs,Y,Ls,Rs).
partition([X|Xs],Y,Ls,[X|Rs]) :-
  X > Y, partition(Xs,Y,Ls,Rs).
partition([],Y,[],[]).

append([],Ys,Ys).
append([X|Xs],Ys,[X|Zs]) :- append(Xs,Ys,Zs).
```

```
tpa(S, L, R) :-
get_time(St),
write("\tStart time: \t"), write(St), nl,
partition(S, L, R),
get_time(Et),
write("\tEnd time: \t"), write(Et), nl,
Ft is Et-St,
write("\tFinish Time: \t"), writeln(Ft)->true.

helper([],[],[],0,0).

helper([X|XS],[X|L],R,SUML,SUMR):-helper(XS,L,R,SUMN,SUMR),SUML is SUMN+X.

helper([X|XS],L,[X|R],SUML,SUMR):-helper(XS,L,R,SUML,SUMN),SUMR is SUMN+X.

partition(S,L,R):-helper(S,L,R,X,X).
```

How easy/hard was it was to program?

Prolog, in my opinion, is the most difficult language to program among all five languages. I have to refer to the example code which appears on the textbook.

The ease/difficulty of debugging:

Understand the difference between an atom and variable is crucial in terms of debugging.

The speed of execution:
Run time already shown in the screenshot above.