**CS 4250 Programming Languages Fall 2018**

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**HOMEWORK #8 [25 points].**

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| Due date: | Section 001 -> We, 12/05 |
| Section E01 -> Th, 12/06 |

Homework will be collected before the lecture! For problem #2, attach a screenshot containing the code and output of your program.

1. [6 points] Show a derivation of a Racket function call shown below and explain what the function mystery is doing:

(define (mystery atm lst)

(cond

((null? lst) '())

((eq? atm ( car lst)) (mystery atm (cdr lst)))

(else (cons (car lst) (mystery atm (cdr lst)))

)))

(mystery 'a '(c a a b a d))

1. [7 points] Write a Racket function that returns a union of two simple list parameters that represent sets. Remember that duplicate elements are not allowed in a set. You may use a program ‘membership.rkt’ from the folder ‘DrRacket’ under ‘Modules’. Run your program several times to show that it properly treats duplicates.
2. [4 points] (a) Describe the syntactic forms of fact and rule statements in Prolog. (b) Give examples of the usage of fact and rule statements.
3. [4 points] Using the structures parent(X,Y), male(X) and female(X), write structures that define father(X,Y) and sister(X,Y).
4. [4 points] Give examples of two different ways of usage of a ‘|’ operator in list processing in Prolog.