

Your Name: _____ Your EID: _____

Circle Your Discussion Section:

- 54075: Ian Wehrman, Friday, 9:00 – 10:00a, ENS 109
- 54080: Ian Wehrman, Friday, 10:00 – 11:00a, GSB 2.122
- 54085: David Rager, Friday, 10:00 – 11:00a, JES A218A
- 54088: Behnam Robatmili, Friday, 12:00 – 1:00p, RLM 5.122
- 54090: Behnam Robatmili, Friday, 1:00 – 2:00p, CBA 4.344
- 54095: Nathan Wetzler, Friday, 1:00 – 2:00p, JES A209A

Midterm Exam 2

CS313K Logic, Sets, and Functions – Spring, 2009

Instructions

Write your name and EID above and circle the unique ID of your discussion section! Write your answers in the space provided. If your proofs fill more than the space provided, you may write on the back of the page but please put “PTO” (“please turn over”) at the bottom and put the Question number at the top of each back page you use. If you use extra paper, be sure to put your name and EID and the Question number on each page!

There are 10 questions worth a total of 200 points. Those requiring proofs are worth more than those not requiring proofs. Partial credit will be given, so do your best on each question. You have until 5:00 pm.

The functions `app`, `tp` (“true-listp”), and `mem`, which have all been used in class, are the familiar functions of those names but I’ve included their definitions on the last page of the exam for your reference. Assume you don’t know anything about the function symbols `P`, `Q`, `f`, `g`, and `h` except whatever is said about them in the statement of each problem.

You may refer to the course notes (the red book) during the exam. You may refer to your own notes if they are on paper. No computers are allowed. No talking is allowed. No cellphones. Remove sunglasses, hats, baseball caps, etc.

The last section of the exam has no questions. It just lists the `defuns` of `app`, `tp`, and `mem`.

Familiar Definitions

```
(defun app (x y)
  (if (endp x)
      y
      (cons (car x)
            (app (cdr x) y))))

(defun tp (x)          ; Called 'true-listp' in the notes.
  (if (endp x)
      (equal x nil)
      (tp (cdr x))))

(defun mem (e x)
  (if (endp x)
      nil
      (if (equal e (car x))
          t
          (mem e (cdr x)))))
```