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))))))