Tenth Quiz

You have 15 minutes from the start of class to complete this quiz. Read the questions with care; work with deliberate speed. Don't give us more than we ask for. The usual instructions apply. Good luck!

Problem 1 (2 points)

Some early computers used decimal circuitry to represent data: The smallest unit of memory was a circuit that could represent 10 different values (i.e., a digit from 0 to 9). No modern computers use decimal circuitry.

(a) What kind of circuitry do they use instead, and how is that circuitry different from decimal circuitry?

(b) Give at least two advantages of the modern circuitry you named in part **(a)** over decimal circuitry.

Problem 2 (9 points)

(a) (1 point) What is redundant information (in just a couple of words—don't be redundant here!)?

(b) (1 point) What does data compression do to redundant information (one or two words)?

(c) (2 points) What's the difference between lossy and lossless compression?

(d) (2 points) To compress a file containing a term paper, would you be likelier to use lossy or lossless compression? In a few words, why?

(e) (2 points) Why would anyone ever want to use lossy compression?

(f) (1 point) What kinds of data are suitable for lossy compression? (Don't just list examples; try to characterize the source or nature of data that's amenable to lossy compression.)

Problem 3 (9 points)

Suppose you have a list of restaurant structures, which are defined as usual:

```
(define-struct rrant (name cuisine phone dish price)).
```

Complete the definition of this function. You may use `map`, `filter`, and `foldr` as appropriate, but you're not required to.

```
;; select-rrants: list-of-rrant (rrant->boolean) (rrant->boolean) -> list-of-rrant
;; Return a list of all rrants on the input list for which BOTH predicate functions
;; are true.
;; Example: To get Thai restaurants in the list RL that serve Mee Krob:
;;   (select-rrants RL Thai? (lambda (R) (string=? (rrant-dish R) "Mee Krob")))
(define select-rrants
  (lambda (RL p1? p2?)
```