Informatics 41 • Fall 2004 • David G. Kay • UC Irvine Your name _____

FOURTH QUIZ

Your student ID _____

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!

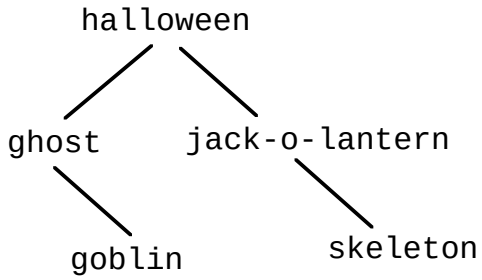
Problem 1 (5 points)

Complete the definition of `count-thai-rrants` below. All the parentheses are in the correct places and each blank should be filled by exactly one symbol, function name, or constant.

```
;; Thai?: rrant -> boolean
;; Return true if the input restaurant serves Thai cuisine
(define Thai?
    (lambda (R)
        (equal? 'Thai (rrant-cuisine R))))
;; count-thai-rrants:  list-of-rrants -> number
;; Return the number of Thai restaurants on the input list
(define count-thai-rrants
    (lambda (L)
        (cond

            ((empty? _____) _____)

            ((_____ (_____ L))

              (_____ _____ (_____ (_____ L))))

            (else (_____ (_____ L))))))
```

Problem 2 (5 points)

(a) (1 point) At the right is a picture of a binary search tree. Insert the value "black cat" into the tree; draw a new branch and node to indicate where it belongs. Be careful to distinguish a left subtree from a right subtree, if necessary (by the angle of the branch).



(b) (1 point) Now insert the value "pumpkin" into the tree.

(c) (2 points) List all seven items in the tree in the order they would be visited in an inorder traversal of the tree. In other words, if you converted this BST to a list using an inorder traversal, what would be the order of items in the list?

(d) (1 point) List the items in the order they would be visited using a preorder traversal.

Problem 3 (10 points)

Suppose we have a binary search tree of simple numbers, with nodes defined as follows:

```
(define-struct node (value left right))
```

where left and right either empty or a node and the binary search tree property holds. Complete the definition below of `in-tree?`.

```
;; in-tree?:  number BST -> boolean
;; Return true if the input number occurs in the BST and false otherwise.
(define in-tree?
     (lambda (num T)
```

Problem 4 (5 points)

(a) (2 points) Which one of the following is the operating system's main goal in doing process control?

❏ Make efficient use of main memory (RAM)

❏ Keep the processor as busy as possible

❏ Allow the processor to execute more than one instruction simultaneously

❏ Give Superman a job as a supermarket checker

(b) (3 points) We discussed three categories of user authentication (one aspect of security): by what you know, by what you have, and by what you are. Give one example of each (computer-based or not).