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.

```scheme
;; 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)) Thai?                          first
    (_______________ _______________ (_______________ (_______________ 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)
  (if (empty? T) false
      (cond ((= num (node-value T)) true)
            ((< num (node-value T)) (in-tree? num (node-left T)))
            (else (in-tree? num (node-right 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).