ICOM 4036: Programming Languages
Fall 2004
Partial Exam III

References

1. All topics covered by exams 1 and 2
2. Lecture 5 slides
3. Sebesta Chapter on Variables, Scopes and Lifetimes
4. Sebesta Chapter on Functional Programming Languages
5. Algorithmic Report on Scheme (First 30 pages)

Practice Exercises

1. Write Scheme functions that apply fold, map or fold-map to compute the following:
    a. The maximum element of a list as determined by the < operator
    b. The member? function for sets implemented as unordered lists
    c. Determine if a lists has an element that is divisible by n
    d. The concatenation of a set of lists
    e. The union of a set of sets

2. Write scheme functions to perform the following computations on binary search trees represented as lists as shown in class
    a. Compute the depth of a tree
    b. Compute the number of elements in a tree
    c. Compute the number of leaves in a tree
    d. Determine if an element is a descendant of another element
    e. Determine is a tree is a subtree of another tree

3. Write scheme functions to perform the following computations on sets represented as lists as shown in class. Write versions for unordered as well as for ordered lists. Compare the time complexity of both versions.
    a. Determine if two sets are equal
    b. Determine if a set is a subset of another set
    c. Compute the power set of a set. That is the set of all subsets of a set.
    d. Compute the Cartesian product of two sets. That is the set of pairs formed by joining each element of the first set with each element of the second set.
    e. Determine is two sets partition a third set. That is, whether the union of the two sets equals the third set and their intersection is empty