

CS 304: Programming Languages

Assignment 5

October 31st, 2012

Due: Wednesday, November 7th, 2012 before the beginning of the class period

1. (3 pts) Do the following exercises from your textbook:
 - a. Chapter 6 Problem Set, Problems 4, 6, 15.
2. (2 pts) Write a program in C or C++ that contains a function that implements slicing operations for 3-dimensional arrays. The following is the function prototype:

```
template <class T>
void SliceArray(T* arrayToSlice, , T* arrayToReturn, int lowerBound_dim1, int
upperBound_dim2, int lowerBound_dim2, int upperBound_dim2, int lowerBound_dim3,
int upperBound_dim3);
```

The function receives the array to slice and six integer parameters: the lower and the upper bounds for each of the three dimensions. The function returns the array of appropriate dimensions, representing the result of the slicing operation. Your program needs not error check parameters for correct ranges. Write a *comprehensive* and *interactive* driver program that allows the user to test the performance of your slicing function.

3. (1 pt) Define a Scheme procedure `power` that takes two numeric parameters, A and B, and returns A raised to the B power.
4. (1 pt) Define a Scheme procedure `prime?` that takes a natural number and returns true if the number is a prime number, and false otherwise.
5. (1 pt) Define a Scheme procedure `minAndMax` that takes a simple list of numbers as a parameter and returns a list with the largest and the smallest numbers in the input list.
For example, `(minAndMax '(1 2 3 4 5))` yields `(1 5)`
6. (1 pt) Define a Scheme procedure `Fibonacci` that takes an integer argument n and prints all of the numbers in the Fibonacci sequence from the first up to the n-th Fibonacci number. The definition of the Fibonacci sequence is:
$$\text{Fibonacci}(0) = \text{Fibonacci}(1) = 1$$
$$\text{Fibonacci}(n) = \text{Fibonacci}(n-1) + \text{Fibonacci}(n-2)$$

For example, `(Fibonacci 7)` yields `(1 1 2 3 5 8 13)`
7. (1 pt) Define a Scheme procedure `subst` that takes three arguments (two arbitrary values and a list) and returns a list just like the given list except that every occurrence of the first value has been replaced with the second value. The procedure must work correctly on both simple lists and complex lists (lists that contain sublists). For example

```
(subst 'c 'k '(c o c o n u t))          should be      (k o k o n u t)
(subst 'c 'k '(c o (c (o c u)) t))      should be      (k o (k (o k u)) t))
```

Turn In Procedures:

You may turn in your assignment via email (bkerkez@yahoo.com) or in person: on paper or on any computer media. If you wish to turn in your assignment via email, your file name should be in the format

lastName_FirstName_AssignmentX.xxx

For example, John Smith's assignment 5 turn in file would be named "Smith_John_Assignment5.xxx".

If you chose to turn in your assignment via email, please make sure that the subject of the email message reads "**CS304_Assignment**". Please print a paper copy of your assignment and turn it in as well.

Please make sure that I receive your assignments before the due date and time. Late assignments will be accepted for 24 hours after they are due and will be penalized by a 50% deduction. No assignments will be accepted after the 24 hour period expires.