

**COSC 6320**  
Spring 2018  
Homework 3

All work submitted should be done by you alone. **You are not allowed to search the Internet for solutions.** You are not allowed to copy the solutions from any source. Collaboration between students is not allowed. On problems selected from the textbook, use the definitions from the book. Definitions from different books may be slightly different.

[1] Use a stack to eliminate recursion from the following procedure.

```
Procedure reverse (L: list){  
    X: element_type  
    If not list_empty(L) then {  
        X = list_retrieve(first(L), L)  
        Delete (list_first(L), L)  
        reverse(L)  
        list_insert(x, list_end(L), L)  
    }  
}
```

[2] Textbook, Exercise 12.4-3 (page 303).

[3] Textbook, Problem 12-1 (page 303).

[4] Suppose that we use an open-address hashing table of size  $m$  to store  $n \leq m/2$  items. Assuming uniform hashing, show that for  $i = 1, 2, \dots, n$ , the probability is at most  $2^{-k}$  that the  $i$ -th insertion requires strictly more than  $k$  probes.

[5] Let  $p_1 \geq p_2 \geq \dots \geq p_n$  be the access frequencies of  $n$  names in a sequential list (implemented as a table). (a) Assuming that only successful searches occur, prove that among all  $n!$  permutations of names in the table those with access frequencies in monotonic non-increasing order have minimum average search time. (b) If unsuccessful searches are included, is the statement in (a) true? Justify your answer.