

CISC320 Algorithms, Homework set 4  
Due Tue, Nov 23, 2010

- A** Modify the `editDistance` function to show the value of string `S` after each edit in a minimal sequence of edits that convert it to string `T`. For instance if `S` is "latch" and `T` is "cache", your program might print:

```
latch
latche
lache
cache
```

(representing 3 edits: an insertion, a deletion, and a substitution.) This may be done by modifying either `editDistanceMemoized` or `editDistanceDP` in `edit-distance.C`. Your solution should work in  $O(mn \log(m+n))$  time.

- B** 8-1. This may be done by a 2 line addition to the `editDistance` function. I suggest you implement this.

In fact you may submit one code as solution to problems A and B. In particular, it is ok if your problem A solution includes swap edits as well as insertions, deletions, substitutions. You may solve A and B individually or as a team of 2. If you work with a partner, you must do 2 things: (1) tell me in advance, and (2) use extreme programming – by this I mean that you actually work out the entire solution together. You do the coding together with at any one time person A at the keyboard while person B looks on and provides observations and advice. What I require teams don't do is divide up the work and go off individually to do it.

- C** 8-4. We will do part of this in class (part a, LCS – but not SCS) so the homework is part (a) SCS and part (b).

- D** A sequence is *palindromic* if it is the same read left to right as read right to left. For example the sequence

hello madam, I'm adam

has many palendromic subsequences (ignoring spaces and punctuation) such as "ll", "madam", "ada", and "madam i'm adam". Create a dynamic programming algorithm that takes a sequence `S[0..n-1]` of letters and returns the length of the longest palendromic subsequence in `S`. The run time should be in  $O(n^2)$ .

- E** Design a function `palindromeEditDistance(S, i, j)` that returns the minimal number of edits (insertions, deletions, substitutions) to convert `S[i..j]` to a palendrome. Note that the palendrome may be shorter or longer than the starting number of characters,  $n = j + 1 - i$ . For instance, one edit turns "abcb" into "abcba". Alternatively, a deletion produces "bcb".

- F** 8-6