CISC-471 WINTER 2016

HOMEWORK 5

Please work on these problems and be prepared to share your solutions with classmates in class on February 22. Assignments will **not** be collected for grading.

Programming

Problems

These questions come from *An Introduction to Bioinformatics Algorithms* by Neil C. Jones and Pavel A. Pevzner.

Problem 6.4: Modify DPCHANGE to return not only the smallest number of coins but also the correct combination of coins.

Problem 6.6: Find the number of different paths from source (n, m) to sink $(0, 0)$ in an $n \times m$ rectangular grid. These paths are described in section 6.3 The Manhattan Tourist Problem. A valid path can only go up or left (no diagonal moves). Write a dynamic programming algorithm to determine this quantity. You can also obtain the result by thinking of a valid path as a string of length $n+m$ using n 'U's and m 'L's. BONUS: Now also allow diagonal moves (up and left). Update your program to handle this additional move. The combinatorial solution now must deal with this additional move in a non-trivial way.

Problem 6.18: What is the optimal global alignment for MOAT and BOAST? Show all optimal alignments and the corresponding paths under the scoring matrix below and indel penalty -1.

0	A	B	M	O	S	T
A	1	-1	-1	-2	-2	-3
B	0	1	-1	-1	-2	-2
M	0	0	2	-1	-1	-2
O	0	0	0	1	-1	-1
S	0	0	0	0	1	-1
T	0	0	0	0	0	0