Algorithms Illuminated Chapter 17 Andrew Voss

Problem 17.1 Manually compute the NW score for these sequences:

x: A G T A C G
y: A C A T A G

Gap cost = 1
Mismatch cost = 2

Indices represent prefix lengths

x \ y	0	1	2	3	4	5	6
0	0	1	2	3	4	5	6
1	1	0	1	2	3		
2	2						
3	3						
4	4						
5	5						
6	6						

2+1 3
1+2 3
1+0 1

etc... 5
not worth 3
writing all out by hand once
a few are validated

Problem 17.2

For knapsack the order matters, because we must be able to look back to 1 fewer item. However, the NW inputs are symmetric in their use, so reversing the for loop must be acceptable.

(d)

Problem 17.3

a) I find the description here hard to parse. However, if this means that the "ammortized" cost per gap is less for wider gap widths, this could no longer be solved in $O(mn)$ because this breaks the subproblem recurrence

b) Similar to NW.

c) Yes, this can be reduced to counting the frequencies of symbols in each string and seeing if they are equal.

d) Similar to NW, can consider each prefix combination.

Problem 17.5

$\theta(1), \theta(n), \theta(n)$