# 3 Exercises – Extension of global alignment

#### 1. DP with score matrix

Use the score matrix below with gap penalty g = 1 and answer the following questions.

	С	G	Α	Т
С	1	0	0	0
G		1	1	0
Α			1	0
Т				1

- (a) Calculate the alignment score.
  - Alignment 1

q: ATGCT d: CA--T

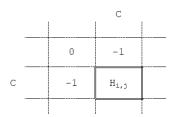
### Solution: 1

• Alignment 2

q: CAGCT d: C-A-T

#### Solution: 1

- (b) Use the simple scorning scheme and fill the empty cells with appropriate scores.
  - Table A



#### Solution: 1

• Table B

## Solution: 1

(c) Fill the empty cells with appropriate scores in the DP table. What is the optimal alignment score?

q\d		С	A	Т
	0	-1	-2	-3
С	-1		0	-1
A	-2	0	2	1
G	-3	-1		2
С	-4	-2		1
Т	-5	-3	-1	

#### Solution: 1

(d) There are two different alignments that give the same optimal score in the solution above. Specify both of them.

#### **Solution:**

- q: CAGCT
- d: CA--T
- q: CAGCT
- d: C-A-T