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.

	C	G	A	T
C	1	0	0	0
G		1	1	0
A			1	0
T				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

		C
	0	-1
C	-1	$H_{i,j}$

     Solution: 1

   - Table B

	C	A
A	0	2
G	-1	$H_{i,j}$

     Solution: 1

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

q\d		C	A	T
	0	-1	-2	-3
C	-1		0	-1
A	-2	0	2	1
G	-3	-1		2
C	-4	-2		1
T	-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
```