IQB Assignment 1

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1.

a.

```
[[ 0 -1 -2 -3 -4 -5 -6 -7 -8 -9]
 [-1 -1  1  0 -1 -2 -3 -4 -5 -6]
 [-2 -2  1  0 -1 -2 -3 -4 -2 -3]
 [-3 -3  0  3  2  1  0 -1 -2 -3]
 [-4 -1 -1  2  5  4  3  2  1  0]
 [-5 -2 -2  1  4  7  6  5  4  3]
 [-6 -3  0  0  3  6  6  5  7  6]
 [-7 -4 -1 -1  2  5  8  7  6  9]]
```

b. yes

c.

('ATCAGAGTA', 'TTC--AGTA')
('ATCAGAGTA', 'TTCA--GTA')
('ATCAGAGTA', 'TTCAG--TA')
Score : 9

2.

a.

```
[[ 0  0  0  0  0  0  0  0  0  0]
 [ 0  0  2  1  0  0  0  0  2  1]
 [ 0  0  2  1  0  0  0  0  2  1]
 [ 0  0  1  4  3  2  1  0  1  1]
 [ 0  2  1  3  6  5  4  3  2  3]
 [ 0  1  1  2  5  8  7  6  5  4]
 [ 0  0  3  2  4  7  7  6  8  7]
 [ 0  2  2  2  4  6  9  8  7 10]]
```

b.

('TCAGAGTA', 'TC--AGTA')
('TCAGAGTA', 'TCA--GTA')
('TCAGAGTA', 'TCAG--TA')
Score : 10

3.

In Local allignment the minimum value in dp matrix can be 0. if any value comes out negative we put 0 in its place.
Also when constructing the answer string in global allignment we start from the lower right corner of the dp matrix but in local allignment we start from the index which has the highest value in the matrix.
In global allignment we keep going till we reach the upper left corner but in local we stop when we encounter a zero in the matrix.

4.

yes, the results will be different.

result for global allignment:

```
[[  0  -2  -4  -6  -8 -10 -12 -14 -16 -18]
 [ -2  -1   0  -2  -4  -6  -8 -10 -12 -14]
 [ -4  -3   1  -1  -3  -5  -7  -9  -8 -10]
 [ -6  -5  -1   3   1  -1  -3  -5  -7  -9]
 [ -8  -4  -3   1   5   3   1  -1  -3  -5]
 [-10  -6  -5  -1   3   7   5   3   1  -1]
 [-12  -8  -4  -3   1   5   6   4   5   3]
 [-14 -10  -6  -5  -1   3   7   5   3   7]]
```

('ATCAGAGTA', 'TTC--AGTA')
('ATCAGAGTA', 'TTCA--GTA')
('ATCAGAGTA', 'TTCAG--TA')
score: 7

result for local allignment:

```
[[0 0 0 0 0 0 0 0 0 0]
 [0 0 2 0 0 0 0 0 2 0]
 [0 0 2 1 0 0 0 0 2 1]
 [0 0 0 4 2 0 0 0 0 1]
 [0 2 0 2 6 4 2 0 0 2]
 [0 0 1 0 4 8 6 4 2 0]
 [0 0 2 0 2 6 7 5 6 4]
 [0 2 0 1 2 4 8 6 4 8]]
```

('TCAG', 'TCAG')

The result is different because the gap penalty is increased so the optimal solution will be penalised more for having gaps hence the number of gaps will be reduced. So the solution will be different. The result length will be reduced as the algorithm will find more close matches and not tolerate much gaps.