10 Exercises – Progressing alignment

1. **Linkage clustering method for progressive alignment**

   Select two alignments from the three alignments, $\mathcal{A}^1 = s^1$, $\mathcal{A}^2 = s^2, s^3$, and $\mathcal{A}^3 = s^4, s^5$, for clustering.

   Pairwise scores

	s^1	s^2	s^3	s^4	s^5
s^1	-	2	3	1	6
s^2		-	-	4	5
s^3			-	3	4
s^4				-	-
s^5					-

   (a) Use the average linkage.

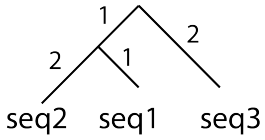
   (b) Use the maximum linkage.

   (c) Use the minimum linkage.

2. **Linear progressive alignment**

Construct an MSA from seq1, seq2, seq3 and a phylogenetic tree by using the progressive alignment method specified below.

seq1: AGCT
seq2: ACT
seq3: AGCAT



- Clustering: Linear clustering
- Aligning method: Pair-guided alignment
- Aligning order: Use the specified tree
- Pairwise DP: Global alignment with linear gap penalty
- DP scoring scheme: match (10), mismatch (-5), gap penalty (10)

(a) What is the aligning order that can be defined by the given tree?

(b) Solve the first pairwise alignment.

(c) Solve the second pairwise alignment.

(d) Find the optimal MSA by combining the first and the second alignments.

(e) What is the SP score of the optimal MSA?