

# M4LP Assignment 1

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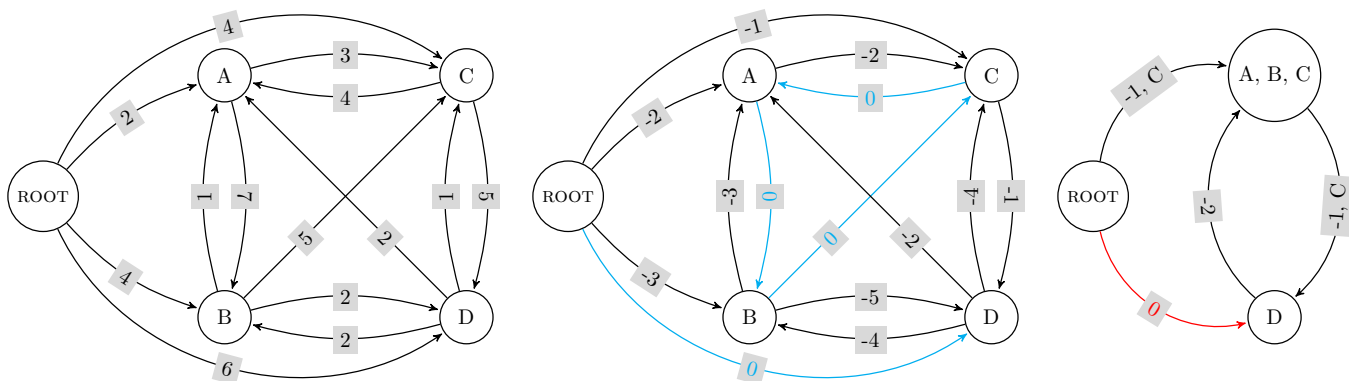
## Abstract

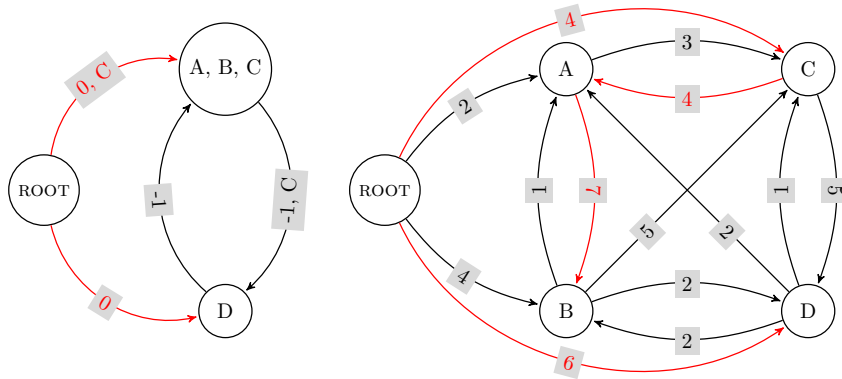
This is our solution to exercise 3 B and 4 C and D from the first homework assignment.

In exercise 3 we were tasked with finding the Maximum Spanning Tree(s) using the Chu-Liu-Edmonds algorithm on the graph shown in the exercise. The graphs are respectively from left to right as follows: The first graph is the unchanged graph from the exercise. The second graph shows all the edges after applying the rule to, for each node, subtract the max of the incoming edge from the other incoming edges. The third graph shows us dealing with the 0-weighted cycle consisting of node A, B and C by combining these nodes into one node and keeping the max edges and noting the corresponding node. Then for the fourth graph we did the same as the second. For the fifth and last graph we backtracked until we arrived back at the original graph but now we can see which edges make up the MST.

In exercise 4 we had to find out how the CCG categorizes the given natural language expressions. If the grammar categorizes an expression, we gave a derivation for it (D). If the grammar could not build a derivation for an expression, we explained why it is so (C).

## 1 Graph-based dependency parsing





## 2 CCG derivations

The first one is C from exercise 4. This one was tricky (we tried a lot of different derivations) and we came to a conclusion that it is not totally possible to build a derivation on this sentence. That is because the sentence is built really weird. Actually it are two sentences combined: 'Ann ate the croquette' and 'Bob ate the bread'. However, because they are linked together into one sentence naturally the verb in the subordinate clause falls away. The only verb in the sentence now does not only apply to Ann but also to Bob which is placed in the subordinate clause. This way you can't link 'Bob the bread' to the sentence since it misses the verb 'ate'. You can, however, derive the sentence 'Ann ate the croquette and Bob' implying that Ann ate Bob as well. This is because now Bob is not a subject in a subordinate clause. It is an object while Ann is still the subject. 'the bread' is then left over as NP and can't be combined with S. For the sake of clarity it is put under one CCG as 'ERROR'.

The second one is D. This one was derivable and is straightforward.

