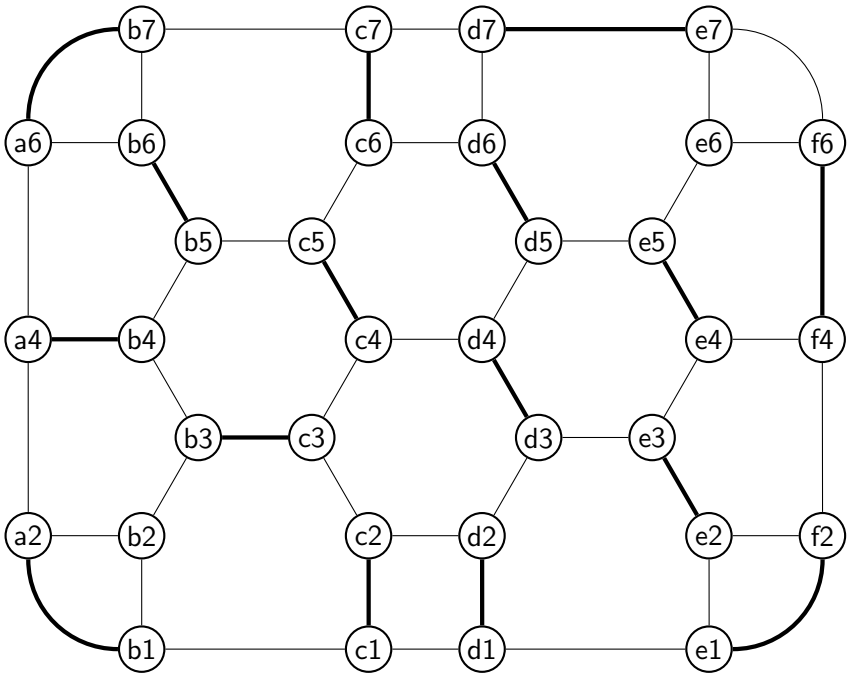
Coursework 3: Graph Algorithms and Complexity Theory

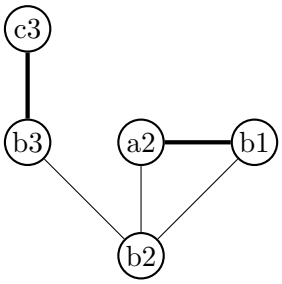
Oskar Mampe

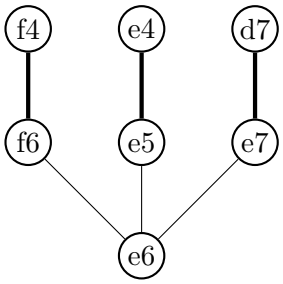
Tutorial Session: Thursday 1pm

In the graph below a matching is indicated by bold lines. The trees created will also have a bold line indicating a matching.

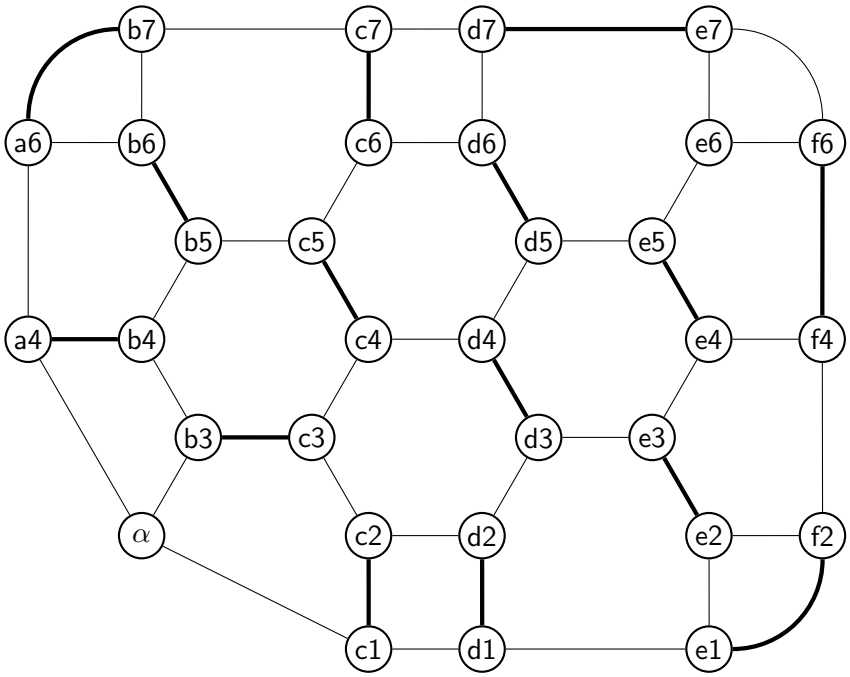


There are two M-unsaturated vertices, namely b2 and e6. Therefore, I initiate Edmond's algorithm starting by growing two alternative trees starting at these two vertices.

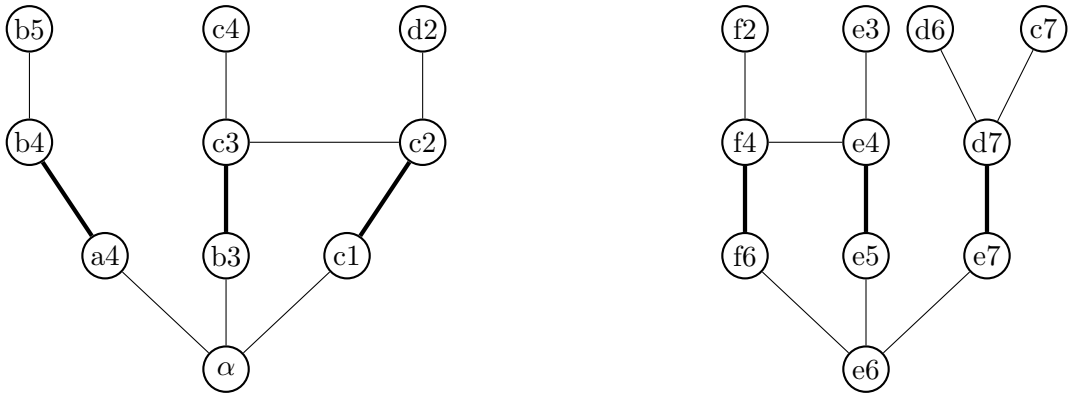




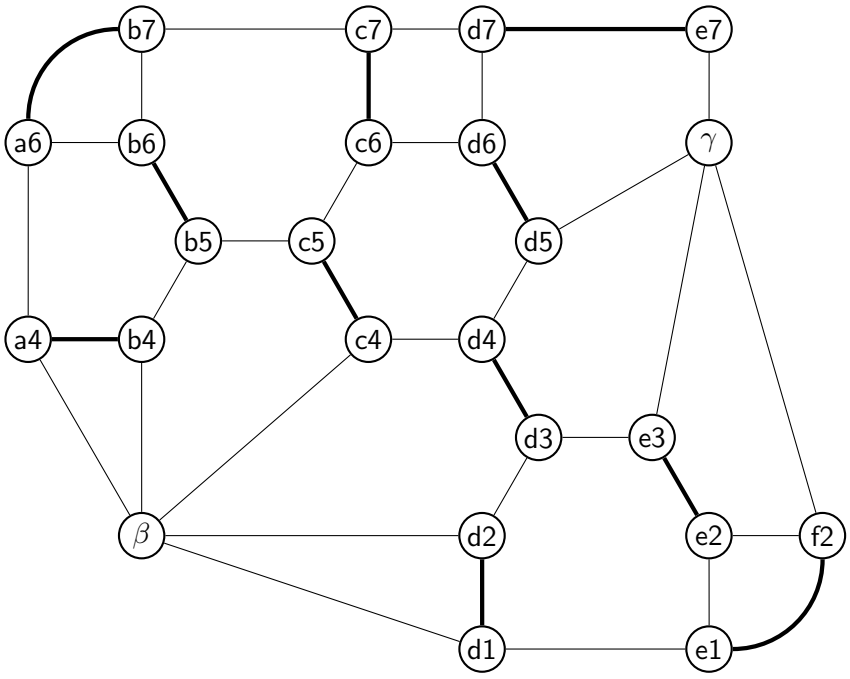
A blossom has been found. The blossom consists of vertices b2, a2, b1 and I shrink it to vertex α. This way, I obtain the following graph:



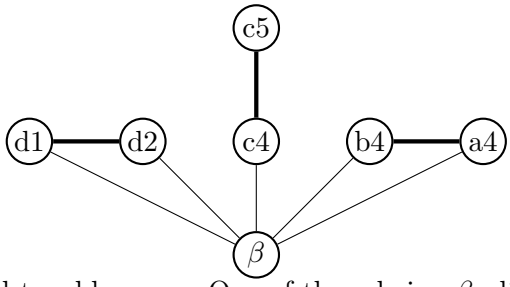
α and e6 are M-unsaturated, so I start growing the two alternative trees again.

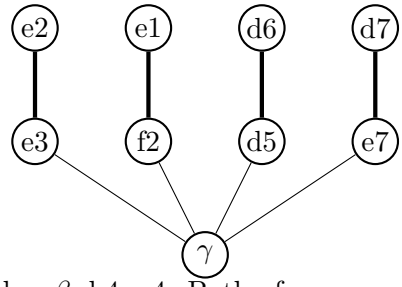


Another two blossoms have been found. One of them being containing α, b3, c3, c2, c1 I will shrink this to vertex β. The other blossom consists of e6, e5, e4, f4, f6 I will shrink this to vertex γ. The following graph is obtained:

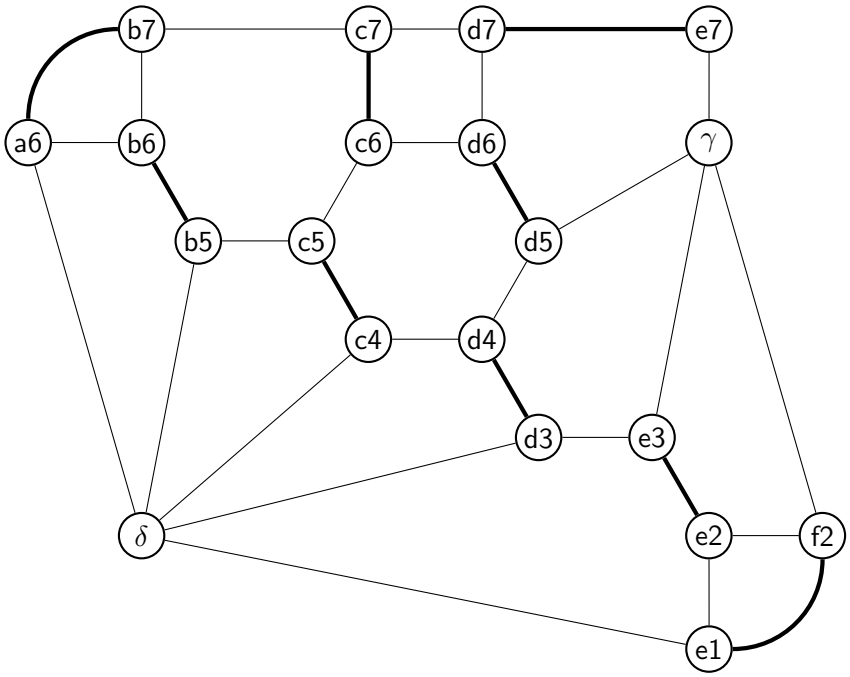


The two M-unsaturated vertices left are β and γ. Therefore, the following alternative trees are grown:

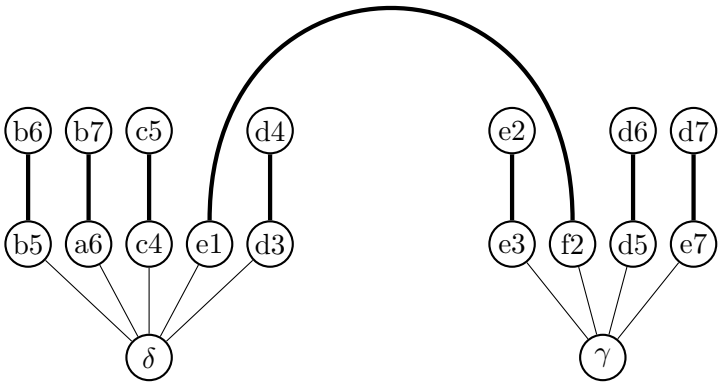




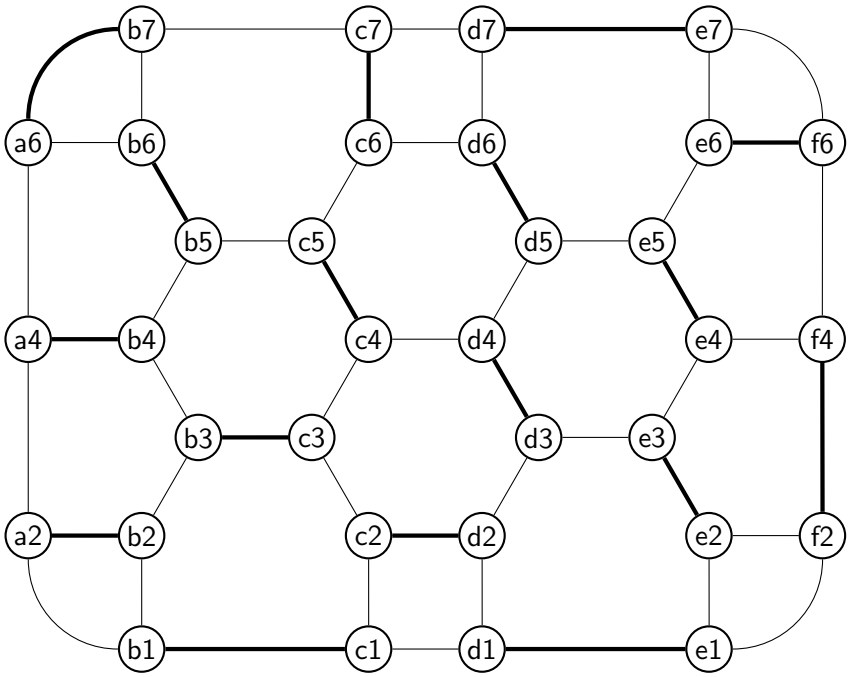
I have found two blossoms. One of them being β, d1, d2 and the other β, b4, a4. Both of these can be shrunk to a single vertex δ. The following graph is then produced:



The two M-unsaturated vertices are δ and γ so the two alternative trees are created:



An augmenting path has been found. The path being (δ, e1, f2, γ). This can be further simplified, by first going around the first blossom {β, d2, d1} and the second blossom {f4, f6, e6}, making the augmenting path (β, d2, d1, e1, f2, f4, f6, e6). There is another blossom to traverse, for which I have chosen the path {α, c1, c2} as it is the only alternative path do d2. This makes the path now (α, c1, c2, d2, d1, e1, f2, f4, f6, e6). Finally, I traverse the last blossom {b2, a2, b1} as it is the only alternative path to c1. Making the final path (b2, a2, b1, c1, c2, d2, d1, e1, f2, f4, f6, e6). I augment the mathicng along the path, and find this following matching:



This is the graph resulting from augmenting the matching along the path. Since there are no more M-unsaturated vertices the algorithm is stopped. The current matching is the maximum one.