Exercise 9.1:
Consider the Graph-TSP and the (unweighted) Minimum 2-edge-connected spanning subgraph problem (2ECSSP) from the lecture. Prove for $\alpha \geq 1$:

(i) If there is an $\alpha$-approximation algorithm for Graph-TSP, there is a $\frac{3}{2}\alpha$-approximation algorithm for 2ECSSP.

(ii) If there is an $\alpha$-approximation algorithm for 2ECSSP, there is a $\frac{2}{3}(1+\alpha)$-approximation algorithm for Graph-TSP.

*Hint:* Use the Lemma of Mömke and Svensson. (3 + 5 points)

Exercise 9.2:
Consider the following algorithm for the 2ECSSP on 2-vertex-connected graphs: Compute an ear-decomposition $H$ for which the internal vertices of 2-ears are not endpoints of any non-trivial ears and form a stable set. Delete all trivial ears from $H$ and return the remaining edges.

(i) Show that the above algorithm can be implemented to run in linear time and is a 2-approximation algorithm.

(ii) Prove a better approximation ratio than 2 for this algorithm.

(iii) What is the best approximation ratio that holds for the above algorithm? (2 + 2 + 2 points)

Please return your solutions before the lecture on Tuesday, *June 18th, 2:15 PM.*

Exercise P.2:
Implement the algorithm from Exercise 9.2. Details, specifications, examples as well as the deadline can be found on the separate programming exercise sheet. (16 points)