1. The graph[1] of Europe[2] $G^* = \langle V, E \rangle$ is defined as follows: each vertex $v \in V$ is a Europe country; two vertices are adjacent ($\{u, v\} \in E$) if the corresponding countries share a land border. Let G be the largest connected component of G^*.

   (a) Draw G^* with the minimum number of intersecting edges.

   (b) Find $|V|$, $|E|$, $\delta(G)$, $\Delta(G)$, $\mathrm{rad}(G)$, $\mathrm{diam}(G)$, $\mathrm{girth}(G)$, $\mathrm{center}(G)$, $\varkappa(G)$, $\lambda(G)$.

   (c) Find the minimum vertex coloring $Z : V \to \mathbb{N}$ of G.

   (d) Find the minimum edge coloring $X : E \to \mathbb{N}$ of G.

   (e) Find the maximum clique $Q \subseteq V$ of G.

   (f) Find the maximum stable set $S \subseteq V$ of G.

   (g) Find the maximum matching $M \subseteq E$ of G.

   (h) Find the minimum vertex cover $R \subseteq V$ of G.

   (i) Find the minimum edge cover $F \subseteq E$ of G.

   (j) Find the shortest closed walk W that visits every vertex of G.

   (k) Find the shortest closed walk U that visits every edge of G.

   (l) Find all biconnected components (blocks) and draw the block-cut tree of G^*.

   (m) Find all 2-edge-connected components of G^*.

   (n) Construct an SPQR tree of the largest biconected component of G^*.

   (o) Add the weight function $w : E \to \mathbb{R}$ denoting the distance between capitals. Find the minimum (*w.r.t.* the total weight of edges) spanning tree T for the largest connected component of the weighted Europe graph $G^*_w = (V, E, w)$.

   (p) Find centroid(T) (*w.r.t.* the ege weight function w).

   (q) Construct the Prüfer code for T.