# 1. Unit: Querying with XPath and XQuery

Solve the first two exercises by XPath:

**Exercise 1.1 (Large EU Members)**
Give the names of all member countries of the EU that have more than 100000 square kilometers.

**Exercise 1.2 (Borders in Mondial)**

a) Return the names of all countries bordering Germany.

b) Return the names of all countries which are bordering countries that are bordering Germany.

For the following exercises, XQuery is recommended. For each exercise, check if the result meets the intention of the query. If necessary, refine the query.

**Exercise 1.3 (Mondial - Organizations with European Participants)**
- Give the names of all organizations that have at least one european member country.
- Give the number of european members in each of these organizations.

**Exercise 1.4 (Mondial - Population density of Northern Africa)**
Compute the population density of the region of Algeria (DZ), Libya (LAR) and all adjacent countries.

**Exercise 1.5 (Mondial - HTML to XML with XQuery)**
Give for each country that has more than 10 million inhabitants, and for that provinces are known, an HTML table as follows: the first row contains the name of the country. The subsequent rows list for each province the name, the population, and the number of inhabitants who live in cities located in this province.

**Exercise 1.6 (Mondial - neighbor pops in descending order)**     Give for each country the sum of the population of its neighbors (in descending order, with those countries with no neighbors coming last).

**Exercise 1.7 (Mondial - 6 max pop countries)**
List the names of the 6 most populated countries.

**Exercise 1.8 (Mondial - Lowest Highest Mountain)**
Give the lowest mountain which is the highest one on its continent.

**Exercise 1.9 (Mondial - Country, Neighbor, Organization)**
- Compute all pairs (country, organization) s.t. the country belongs to the organization, but all its neighbors do not belong to the organization.
- Compute all pairs (country, organization) s.t. the country does not belong to the organization, but all its neighbors belong to the organization.

**Exercise 1.10 (Mondial - Organizations and Continents)**
List the names of all organizations with at least one member country on each continent.

**Exercise 1.11 (Enclosing Organizations)**
Give all pairs of organizations $O_1$ and $O_2$ where $O_1$ has at least 30 member countries, and the set of members of $O_2$ encloses the set of members of $O_1$.

**Exercise 1.12 (Non-Coverable Organizations)**
Give the smallest (wrt. number of members) organization $O_1$ which is not covered by any other organization $O_2$ (i.e. for all other organizations $O_2$, $O_1$ has at least one member which is not a member of $O_2$).

**Exercise 1.13 (User-defined function: Recursive Network Length)**
Write a recursive function that computes the length of a river system from a given river to all springs of that system.

**Exercise 1.14 (User-defined Function: Functional Programming – Fibonacci)**
Write a recursive function that computes the $n$-th Fibonacci Number (defined as $fib(n) := fib(n-1) + fib(n-2)$, $fib(0) := 0$, $fib(1) := 1$). Give the asymptotic complexity of your solution. Try to provide a linear algorithm.