4. Unit: Transforming XML with XSLT

Exercise 4.1 (XML to HTML) Write an XSLT routine that outputs the following country data for all countries with more than 1000000 inhabitants in an HTML table with rows of the form (property: value):

- country name
- car code
- capital's name
- number of inhabitants
- the names of all listed cities, inside a nested HTML table.

Exercise 4.2 (XML to XML) Write an XSL stylesheet that, for every organization (optionally: that has been established before 1990), outputs its name, the names of all member countries, and the name of the city where its headquarter is located. The result should conform with the following DTD:

```
<!ELEMENT result (organization*)>
<!ELEMENT organization (country*, headq)>
 <!ATTLIST organization name #REQUIRED>
<!ELEMENT country (#PCDATA)>
<!ELEMENT hq (#PCDATA)>
```

Exercise 4.3 (Arithmetic Terms) Arithmetic terms over integer values and operators $+, -, *$ and div (integer division) can be represented by their syntax trees, with the syntax trees given in XML. A possible XML notation for syntax trees is given in the following example for the term

$$4 + ((7 - 2) \; div \; 2)$$

```
<term>
   <plus>
      <val>4</val>
      <div>
         <minus>
            <val>7</val>
            <val>2</val>
         </minus>
         <val>2</val>
      </div>
   </plus>
</term>
```

a) Write down the syntax tree for the term $((91 \; div \; (19 - (3 * 8))) + 3)$, using the XML notation from the above example.

b) Write a DTD for the given notation. Each term should be considered a single XML document instance.

c) Write three XSLT stylesheets that take a syntax tree in the notation depicted above as input, and produce as output

- the term as text in *inorder* notation (outcome should be `(4+((7-2) div 2))` for the example),
- the term as text in *preorder* notation (outcome should be `+ 4 div - 7 2 2`), and
- the term as text in *postorder* notation (outcome should be `4 7 2 - 2 div +`).

Test the stylesheets using the term $((91 \; div \; (19 - (3 * 8))) + 3)$ as input.

d) Write an XSLT stylesheet that evaluates a syntax tree in the notation depicted above.