OWL Exercises solution

Exercise slide 21.

Represent an Object Property:

- ancestor such as If person A is an ancestor of person B and B of C then A is also an ancestor of C.

```
<owl:ObjectProperty rdf:ID="ancesotor">
  <rdf:type rdf:resource="&owl;TransitiveProperty" />
  <rdfs:domain rdf:resource="#Person" />
  <rdfs:range rdf:resource="#Person" />
</owl:ObjectProperty>
```

- akin such as if a Person A is akin to a Person B then B is also akin to A.

```
<owl:ObjectProperty rdf:ID="akin">
  <rdf:type rdf:resource="&owl;SymmetricProperty" />
  <rdfs:domain rdf:resource="#Person" />
  <rdfs:range rdf:resource="#Person" />
</owl:ObjectProperty>
```

- hasFather such as a child has always the same (biological) Father

```
<owl:ObjectProperty rdf:ID="hasFather">
  <rdf:tyoe rdf:resource="&owl;FunctionalProperty"/>
</owl:ObjectProperty>
```

- hasChild such as If a Person A hasChild a Person B then B hasFather A

```
<owl:ObjectProperty rdf:ID="hasChild">
  <owl:inverseOf rdf:resource="hasParent" />
</owl:ObjectProperty>
```

Exercise slide 29.

- A Mother is a Woman that has a child (some Person)

```
<owl:Class rdf:ID="Mother">
  <rdfs:subClassOf rdf:resource="#Woman" />
    <rdfs:subClassOf>
      <owl:Restriction>
        <owl:onProperty rdf:resource="#hasChild" />
        <owl:someValuesFrom rdf:resource="#Person" />
     </owl:Restriction>
   </rdfs:subClassOf>
</owl:Class>
```

- The set of parents that only have daughters (female children)

```
<owl:Class rdf:ID="ParentsWithOnlyDaughters">
 <rdfs:subClassOf rdf:resource="#Person" />
   <rdfs:subClassOf>
     <owl:Restriction>
        <owl:onProperty rdf:resource="#hasChild" />
        <owl:allValuesFrom rdf:resource="#Woman" />
     </owl:Restriction>
   </rdfs:subClassOf>
    ...
</owl:Class>
```

- The set of all child of the woman MARRY

```
<owl:Class rdf:ID="MarysChildren">
  <rdfs:subClassOf rdf:resource="#Person" />
    <rdfs:subClassOf>
      <owl:Restriction>
        <owl:onProperty rdf:resource="#hasParent" />
        <owl:hasValue rdf:resource="#MARRY" />
      </owl:Restriction>
    </rdfs:subClassOf>
   </rdfs:subClassOf>
   ...
```

- A half Orphan (i.e. a person that has only one Parent)

```
<owl:Class rdf:ID="HalfOrphan">
  <rdfs:subClassOf rdf:resource="#Person" />
    <rdfs:subClassOf>
      <owl:Restriction>
        <owl:onProperty rdf:resource="#hasParent"/>
        <owl:cardinality rdf:datatype="&xsd;NonNegativeInteger">1</owl:cardinality>
      </owl:Restriction>
    </rdfs:subClassOf>
  </rdfs:subClassOf>
  …
</owl:Class>
```

Exercise slide 34.

This defines the class `NonFrenchWine` to be the intersection of `Wine` with the set of all things *not* located in France.

Exercise slide 37.

- Person ⊑ Man ⊔ Woman

```
<owl:Class rdf:ID="Person">
  <owl:unionOf rdf:parseType="Collection">
    <owl:Class rdf:about="#Woman" />
    <owl:Class rdf:about="#Man" />
  </owl:unionOf>
</owl:Class>
```

- Man ⊑ Person ⊓ Male

```
<owl:Class rdf:ID="Man">
  <owl:intersectionOf rdf:parseType="Collection"
    <owl:Class rdf:about="#Person" />
    <owl:Class rdf:about="#Male" />
  </owl:intersectionOf>
</owl:Class>
```

Exercise slide 50.

```
<?xml version="1.0"?>
<!DOCTYPE rdf:RDF [
<!ENTITY foaf "http://xmlns.com/foaf/0.1/" >
<!ENTITY owl "http://www.w3.org/2002/07/owl#" >
<!ENTITY xsd "http://www.w3.org/2001/XMLSchema#" >
<!ENTITY rdfs "http://www.w3.org/2000/01/rdf-schema#" >
<!ENTITY rdf "http://www.w3.org/1999/02/22-rdf-syntax-ns#" >
]>
<rdf:RDF xmlns="http://www.ontologies.com/shopping.owl#"
      xml:base="http://www.ontologies.com/shopping.owl"
      xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
      xmlns:foaf="http://xmlns.com/foaf/0.1/"
      xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
      xmlns:owl="http://www.w3.org/2002/07/owl#"
      xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-ns#>
<owl:Ontology rdf:about=""/>

<!-- (1) the 3 main classes: -->
<owl:Class rdf:ID="Shop"/>
<owl:Class rdf:ID="Customer"/>
<owl:Class rdf:ID="Product">

<!-- (2) properties name and email: -->
<owl:DatatypeProperty rdf:ID="email">
      <rdf:type rdf:resource="&owl;FunctionalProperty"/>
      <rdfs:domain>
            <owl:Class>
                  <owl:unionOf rdf:parseType="Collection">
                        <owl:Class rdf:about="#Customer"/>
                        <owl:Class rdf:about="#Shop"/>
                  </owl:unionOf>
            </owl:Class>
      </rdfs:domain>
      <owl:sameAs rdf:resource="&foaf;mbox"/>
</owl:DatatypeProperty>

<owl:DatatypeProperty rdf:ID="name">
      <rdfs:domain>
            <owl:Class>
                  <owl:unionOf rdf:parseType="Collection">
                        <owl:Class rdf:about="#Customer"/>
                        <owl:Class rdf:about="#Shop"/>
                  </owl:unionOf>
            </owl:Class>
      </rdfs:domain>
      <rdfs:range rdf:resource="&xsd;string"/>
      <owl:sameAs rdf:resource="&foaf;name"/>
</owl:DatatypeProperty>

<!-- (3) order number -->
<owl:DatatypeProperty rdf:ID="orderNumber">
      <rdf:type rdf:resource="&owl;InverseFunctionalProperty"/>
      <rdfs:domain rdf:resource="#Product"/>
      <rdfs:range rdf:resource="&xsd;int"/>
</owl:DatatypeProperty>

<!-- (4) sells and soldBy -->
<owl:ObjectProperty rdf:ID="sells">
```

```
      <rdfs:domain rdf:resource="#Shop"/>
      <rdfs:range rdf:resource="#Product"/>
      <owl:inverseOf rdf:resource="#soldBy">
</owl:ObjectProperty>

<owl:ObjectProperty rdf:ID="soldBy"/>

<!-- (5) BigShop -->
<owl:Class rdf:ID="BigShop">
      <rdfs:subClassOf>
            <owl:Restriction>
                  <owl:onProperty rdf:resource="#sells"/>
                  <owl:minCardinality
            rdf:datatype="&xsd;int">100</owl:minCardinality>
            </owl:Restriction>
      </rdfs:subClassOf>
      <rdfs:subClassOf rdf:resource="#Shop"/>
</owl:Class>

<!-- (6) A Product must not be a Customer -->
<rdf:Description rdf:about="#Product">
      <owl:disjointWith rdf:resource="#Customer"/>
</rdf:Description>

<!-- (7) PurchaseAndSale -->
<owl:Class rdf:ID="PurchaseAndSale">
      <rdfs:subClassOf>
            <owl:Class>
                  <owl:intersectionOf rdf:parseType="Collection">
                        <owl:Class rdf:about="#Customer"/>
                        <owl:Class rdf:about="#Shop"/>
                  </owl:intersectionOf>
            </owl:Class>
      </rdfs:subClassOf>
</owl:Class>
</rdf:RDF>
```