1. Consider the following XML document: (10 points)

<Customers>

  <person><name><first_name> John</first_name> <last_name> Smith</last_name> </name>
<age>42</age> <hobby> Jogging</ hobby ><hobby>Swim </ hobby > </person>

<person><name><first_name> Mary</first_name> <last_name> Addy </last_name> </name>
<gender>F</gender> <hobby>Reading</ hobby > </person>

</Customers>

Write a DTD file for the above document.

2. Write the answers for the following XPath expressions based on the XML document in Question 1. (9 points)
(a) Customers/ person/hobby
(b) Customers//age
(c) Customers//person[first_name]

3. Consider the following table and JSON document. Write the answer with JSON format for the SQL-like query to join table and JSON documents. (6 points)

Customer table:

Name	Age	Gender
John	32	Male
Mary	27	Female
Anna	9	Female

JSON document
{
   "Orders": {
{ "Order_ID": 1, "Customer_Name": "John", "Items": ["Book", "Bag"]},
{ "Order_ID": 2, "Customer_Name": "Mary", "Items": ["Bag", "Food"]},
{ "Order_ID": 3, "Customer_Name": "John", "Items": ["Phone"]},
{ "Order_ID": 4, "Customer_Name": "Anna", "Items": ["Toy"]}
  }
 }

Query:

Select C.Name As Name,   AVG (Size(O.Items)) As Quantity
From Customer As C Join Orders As O On C.Name=O.Customer_Name
Where O.Age>12
Group By C.Name

Note that Size(A) returns the size of elements in the array A.

4. Consider the following XML document. Write XPath or XQuery to answer the query. Please test your query online at http://www.xpathtester.com/xquery

```
<?xml version="1.0" encoding="UTF-8"?>

<bookstore>

<book category="cooking"> <title lang="en">Everyday Italian</title> <author>Giada De Laurentiis</author> <year>2005</year> <price>30.00</price> </book>

<book category="children"> <title lang="en">Harry Potter</title> <author>J K. Rowling</author>

<year>2005</year> <price>29.99</price> </book>

<book category="web"> <title lang="en">XQuery Kick Start</title> <author>James McGovern</author> <author>Per Bothner</author> <author>Kurt Cagle</author> <author>James Linn</author> <author>Vaidyanathan Nagarajan</author> <year>2003</year> <price>49.99</price> </book>

<book category="web" cover="paperback"> <title lang="en">Learning XML</title> <author>Erik T. Ray</author> <author>Kurt Cagle</author> <year>2003</year> <price>39.95</price> </book>

</bookstore>
```

1). Select all the title elements under the book elements that are under the bookstore element that have a price element with a value that is higher than 30. (5 points)

2) Select all the title elements under the book elements that are under the bookstore element, and return the title elements in alphabetical order. (5 points)

3) List books published after 1991 and price is greater than 39.95, including their year and title. (5 points)

4) Select all the title elements under the book elements which have at least three authors (5 points)

5) List book pairs which have at least one common author and list the corresponding overlapping author(s). (5 points)