University of Toronto
CSC343, Summer 2019

XML and DTDs: Exercises

XML document

The following XML document is well-formed

```
<?xml version="1.0" standalone="no" ?>
<!DOCTYPE DATA SYSTEM "blah.dtd">
<DATA>
   <ANIMALS>
      <COW name = "Snowball" home = "Red Barn Acres"/>
      <HEN name = "Henrietta" birthdate = "120724" home = "Red Barn Acres"/>
   </ANIMALS>
   <FARMS>
      <FARM owner = "Old MacDonald" name = "Red Barn Acres">
         A picturesque hobby farm on 150 acres
      </FARM>
      <FARM owner = "Wiloughby Clive" name = "Weatherby Farm">
      </FARM>
      <FARM owner = "Egg Masters Inc" name = "Farm 23">
         A factory farm on a quarter section of land
      </FARM>
      <FARM owner = "Wiloughby Clive" name = "">
      </FARM>
   </FARMS>
</DATA>
```

Questions

1. Let's recap some terminology.

   (a) What is the root element of this XML file?

   (b) Name three tags in the XML file.

   (c) Name an empty element in the XML file.

   (d) Name three attributes in the XML file.

   (e) Is this XML document well-formed? Explain.

   (f) Is this XML document valid? Explain.

Here is the XML again, for reference:

```
<?xml version="1.0" standalone="no" ?>
<!DOCTYPE DATA SYSTEM "blah.dtd">
<DATA>
   <ANIMALS>
      <COW name = "Snowball" home = "Red Barn Acres"/>
      <HEN name = "Henrietta" birthdate = "120724" home = "Red Barn Acres"/>
   </ANIMALS>
   <FARMS>
      <FARM owner = "Old MacDonald" name = "Red Barn Acres">
         A picturesque hobby farm on 150 acres
      </FARM>
      <FARM owner = "Wiloughby Clive" name = "Weatherby Farm">
      </FARM>
      <FARM owner = "Egg Masters Inc" name = "Farm 23">
         A factory farm on a quarter section of land
      </FARM>
      <FARM owner = "Wiloughby Clive" name = "">
      </FARM>
   </FARMS>
</DATA>
```

2. Suppose this XML is valid with respect to its DTD. For each of the following rules, circle Yes or No to indicate whether it could be part of that DTD.

`<!ELEMENT DATA (ANIMALS+, FARMS*)>`	Yes	No
`<!ATTLIST COW birthdate CDATA #IMPLIED>`	Yes	No
`<!ELEMENT HEN EMPTY>`	Yes	No
`<!ELEMENT ANIMALS (HEN | COW)*>`	Yes	No

3. Write a DTD definition for element FARMS that accepts the above instance document and enforces this rule: There must be at least four farms in the file. If this is not possible, explain why

4. Write a DTD definition for attribute `name` of element `FARM` that accepts the above instance document and enforces this rule: No two farms have the same name. If this is not possible, explain why.

5. Suppose our DTD includes a rule defining an element called `DOG` — we just didn't happen to engage it in this XML file. Write a new DTD rule for element `ANIMALS` that enforces the following: there must be at least one `DOG`, and the order of the animals is all `DOG`s first, then `HEN`s and `COW`s in any order.