UMBC CMSC 491/691 Final Exam  
19 December 2016

Please write all of your answers on this exam, using the blank side of pages if you need more room. The exam is closed book/notes and has seven problems that add up to 150 points. You have the two hours to work on this exam. Good luck.

1. True/False (20 points)

T   F  XML was first defined as an extension of HTML for data.
T   F  XML data model is based on a tree.
T   F  Any constraints expressible in XML’s document type definition (DTD) can also be expressed in XML Schema (XSD).
T   F  Metadata is “data about data.”
T   F  RDF’s data model is based on XML with extended data types.
T   F  The N3 RDF serialization is like Turtle, but it also supports simple rules.
T   F  Reification is used in RDF to make statements about triples.
T   F  RDFS extends RDF by adding terms that allow default reasoning.
T   F  Reasoning complexity in RDFS is decidable.
T   F  It is not possible to state a logical contradiction in RDFS.
T   F  One cannot make statements about properties in RDF or RDFS.
T   F  OWL’s data model is based on RDF, but introduces terms with new semantics.
T   F  OWL-DL is an OWL profile based on Deontic Logic.
T   F  OWL extends RDFS by allowing inherited properties to be overridden.
T   F  An OWL class represents a set of individuals.
T   F  Every OWL knowledge base can be serialized in the Turtle notation.
T   F  Any inference that can be made by an OWL-DL reasoner can also be made using SWRL rules.
T   F  The SPARQL language can only be used to query a triple store and cannot be used to delete or add triples in the store.
T   F  The Schema.org vocabulary was initially specified by a W3C standards committee.
T   F  RDFS is adequate to define the terms in the Schema.org schemata.
2. XML vs. RDF/OWL (20 points)

Describe the major differences between XML and the RDF/OWL as languages for representing information. Give examples of appropriate use cases for each language as well as their advantages and disadvantages.
3. OWL Assumptions (20 points)

(a) OWL makes the **open-world assumption**. Explain what this is and why it is appropriate for a knowledge representation language for the Web.

(b) OWL also does not make the **unique name assumption**. Explain what this is and why not making it is a reasonable choice for a knowledge representation language for the Web.
4. **Graph ⇔ Turtle (50 points)**

Consider the RDF graph on the right.

(a) Serialize the graph (without any inferred nodes or edges) using Turtle. You need not show prefix definitions. A Turtle example is shown below the graph. (20)

(b) Add any nodes and/or edges that can be inferred to the graph on the right and also serialize the inferred nodes/edges in Turtle. (10)

(d) Draw a small star on the nodes that represent instances, as opposed to classes. (10)

(e) Write appropriate domain & range assertions for properties :wrote, :year and :title in Turtle (10)

```
:trump a :Person;
  foaf:knows :pense, :ivanka;
  :age "70"^^xsd:integer .
```
5. On blank nodes (10 points)
One of the nodes in the graph in the previous question is blank, i.e., it has no identifier associated with it. Explain the significance of and motivation for blank nodes in RDF/OWL.

6. Disjoint classes (10 points)
We can assert that two classes are disjoint in OWL using the owl:disjointWith property, e.g., :Man owl:disjointWith :Woman. There are other ways to specify that two classes are disjoint without using this property. In Turtle, write two different ways to assert that :Man and :Woman are disjoint without using owl:disjointWith. (Hint: consider using owl:ComplementOf and owl:Nothing along with other OWL/RFS constructors).
7. Embedding structured data in Web pages (20 Points)

Briefly describe the four major approaches in current use for embedding structured content in Web pages (i.e., Microformats, Microdata, RDFa and JSON-LD). Give at least one advantage and one disadvantage for each.