In the Name of God

Assignment #1 of Semantic Web

Defined date: October 9, 2016

Deadline: October 21, 2016

Principles

Students are supposed to follow the following rules.

- Once you are done, pack all your documents (if there are multiple ones) into a single ZIP file and send to semanticweb95@gmail.com Please format your E-Mail's title like the item below.
  
  SW - [Your Student ID] - [Assignment Number]
  example: SW-95111111-1

- Deadlines are unlikely to get extended, hence it is highly recommended to do your assignments by its deadline.

- If you submit your assignments late, the following rules apply:
  - Up to 1 day late, you will lose 25% credits of the assignment at hand.
  - Up to 2 days late, you will lose 50% credits of the assignment at hand.
  - Up to 3 days late, you will lose 75% credits of the assignment at hand.

- You can turn in your assignments in either hand-written or typed format. However typed formats would be more welcomed. Nevertheless, if you would prefer hand-written format, you are expected to:
  - Write legibly!
  - Scan your documents and prepare a well-known image type (e.g. jpg) for sending by E-Mail.

- There will be a zero-tolerance policy for cheating/plagiarism.

- Kindly drop us an E-Mail, if you need further information or somethings seem unclear.
**Semantic web introduction**

Search the web and explain 2 applications of Semantic Technology in real world use cases.

**Propositional logic**

**Problem 1:** Assuming A, B and C are logical propositions, which of the following statements are tautologies? Is Propositional Logic decidable? (explain)

A. \((A \lor B) \rightarrow (A \land B)\)

B. \((A \lor \neg B) \land (\neg A \land B)\)

C. \(((A \land B) \lor C) \leftrightarrow ((A \land C) \lor (B \land C))\)

D. \((A \leftrightarrow B) \land (B \leftrightarrow C) \land \neg (A \leftrightarrow C)\)

**First order logic**

**Problem 2:** Represent the following sentences in FOL. The needed relations are:

- Person(p): p is a person
- Nationality(p,n,r): p is a citizen of n for reason r.
- Resident(p,c): p is a resident of c
- Parent(p,x): p is the parent of x
- Born(p,c): p is born in c
- Deceive (sm; p; t): statesman s can deceive person p in time t.

a) “A person born in IRAN, each of whose parents is an IRAN citizen or an IRAN resident, is an IRAN citizen by birth”.

b) “A person doesn’t born in IRAN, one of whose parents is an IRAN citizen by birth, is an IRAN citizen by descent”.

c) “some of the statesman can deceive some of the people all of the time, and they can deceive all of the people some of the time, but they can’t deceive all of the people all of the time.”
Problem 3: One writes the following FOL statement for "Ratnic company hires those persons who is not hired by another company"

\[ \forall x . \text{Hire(Ratnic, x)} \leftrightarrow \forall y. \neg \text{Hire(y, x)} \]

We have relations Hire(x,y) and company(x) for ‘x’ as a company and ‘y’ as an Employee. Is it correct or not? why?

Problem 4: If we have relations Shaves(x,y) and barber(x), how could we tell that ‘‘There is a barber that he shaves every mans if and only if the latter does not shave himself’’

Problem 5: Consider the phrase ‘‘the enemy of my enemy is my friend’’ (stated more precisely above). Can we convert this sentence into propositional logic? What about first-order logic?

Problem 6: Why Entailment in first-order logic is semi decidable? Explain in your own word.

Good luck