Technologies du web sémantique

Written exam

Question 2

DL Reasoning

Consider the knowledge base made of the following axioms
On considère la base de connaissances formée des axiomes ci-dessous

TBox

Student $\subseteq$ Person
Student ≡ studies **some** Discipline
Professor $\subseteq$ Person

Physics $\subseteq$ Discipline

University ≡ (hasMember **some** Professor) **and** (hasMember **some** Student)
University $\subseteq$ Institution,
University $\subseteq$ hasMember **only** (Professor **or** Student)

Bicycle $\subseteq$ hasOwner **only** Person
ElectricBicycle $\subseteq$ Bicycle

ABox

	RDF equivalent
University(UNIGE)	UNIGE rdf:type University
ElectricBicycle(flyer01)	flyer01 rdf:type ElectricBicycle
hasOwner (flyer01, UNIGE)	flyer01 rdf:hasOwner UNIGE

1. What will be the inferred members (if any) of the classes *Bicycle*, *Institution*, and *Person*? Briefly justify your answers.
Quels seront les membres inférés des classes Bicycle, Institution, et Person (s'il y en a) ? Justifiez brièvement vos réponses.

Bicycle: flyer01, because flyer01 is a member of ElectricBicycle $\subseteq$ Bicycle
Institution : UNIGE, because UNIGE is a member of University $\subseteq$ Institution
Person : UNIGE,
because flyer01 rdf:hasOwner UNIGE and flyer01 is a Bicycle and Bicycle $\subseteq$ hasOwner **only** Person

2. If we add the following axioms to define classes *X*, *Y*, and *Z*, what would be the inferred

superclasses of *X*, *Y*, and *Z*? Briefly justify your answers.
Si on ajoute les axioms ci-dessous pour définir les classes X, Y et Z, quelles seront les superclasses inférées de X, Y et Z ? Justifiez vos réponses.

X ≡ (hasMember **min** 2 Professor) **and** (hasMember **min** 3 Student)

X ⊆ University
because
hasMember **min** 2 Professor ⊆ hasMember **some** Professor
and
hasMember **min** 3 Student ⊆ hasMember **some** Student
and
University ≡ (hasMember **some** Professor) **and** (hasMember **some** Student)

Y ≡ (hasMember **some** (studies **some** Physics))
and (hasMember **min** 2 Professor)

Y ⊆ University
because
hasMember **some** (studies **some** Physics) ⊆ hasMember **some** (studies **some** Discipline) ≡ hasMember **some** Student
and
hasMember **min** 2 Professor ⊆ hasMember **some** Professor
and
University ≡ (hasMember **some** Professor) **and** (hasMember **some** Student)

Z ≡ (hasMember **only** Professor) **or** (hasMember **only** Student),
Y ⊆ Thing
Y ⊄ University
because
(hasMember **only** Professor) **or** (hasMember **only** Student) ⊄ hasMember **some** Professor) **and** (hasMember **some** Student
moreover
(hasMember **only** Professor) **or** (hasMember **only** Student) ⊄ Institution