**First Class**: student

**Necessary Condition**: sebas:hasFullName

As we have stated untill now, any student must be also of type people, that means that having a **fullName** Data Property is a necessary condition to be a student, however, not necessary and sufficient. As for a counterexample of this situation the instance JohnDoe has a fullName property however, that only classifies him as a people and not a student.

**Necessary and Sufficient Condition**: sebas:fullName and sebas:isColleague

As we have stated untill now, any student must be also of type people. In that regard, having a fullName Data Property and being related academiclly with any other student by the Object Property **isColleague** makes an instance be for sure of type student, therefore these are necessary and suficient conditions for the belonging on the class student.

**Second Class**: popularMajors

**Necessary Condition**: rdf:type major

We know that for any major to be classified as popular it firstly as to be classified as a **major**, as it would be ilogical for some instance to belong to the popularMajors class without belonging at first to the major class.

**Necessary and Sufficient Condition**: sebas:hasNumberOfStudent **some** xsd:integer[>=500]

Finally, if any instance has a numberOfStudents greater or equal to 500, we unmistakably know that instance is not only of type major but also a **popular major**.

**Task 4b (1 Point): Reasoning over conditions**

Run the reasoner once again (after having added the two conditions).

Write down the different steps of the reasoning process (ie, what happens when you run the reasoner). Also write down and explain the resulting inferences below.

**First Class**: student

First Reasoning over condition: SebastiaoRosalino was explicitly stated as being a student, with a fullname as a necessary condition and being enrolled in a course (knowledge and data) as a necessary and sufficient condition. Then, MariaScharakova (with a fullname "Maria Theresa Scharakova" as a necessary condition) was stated of being a colleague of SebastiaoRosalino. This was enough for the reasoner to infer that the instance MariaScharakova was of type student, because the Object Property **isColleague** was defined as having domain and range students.

Triple Infered: sebas:MariaScharakova rdf:type sebas:student .

Second Reasoning over condition: An instance named JohnDoe (with fullname "John Cameron Doe") was created as just belonging to class people without any colleague or any other academic reference. Thus, as having a fullname is just a necessary but not sufficient condition, the reasoner cannot infer any academic relation between JohnDoe and the VU. So it is not possible to conclude that JohnDoe is a student.

**Second Class**: popularMajors

First Reasoning over condition: Firstly, the major economics was inferred to be a major because it had a Data Property **hasNumberOfStudents** (which has its domain of type major). As it was created the condition that a major having 500 or more students would automaticlly be of type popular major, and the major economics has exactly 521 students, the reasoner was able to infer the membership of the instance major economics to the class popularMajors.

Triple Infered: sebas:economics rdf:type sebas:popularMajors .

Second Inferrence: An instance named BrunoFernandes (with fullname "Bruno Miguel Borges Fernandes") was created without have being specified to belong to any class. After that, it was stated that BrunoFernandes was enrolled in the course intelligent systems. As the Object Property **isEnrolledIn** has as its domain a student the reasoner was able to infer that BrunoFernandes was a student.

Triple Infered: sebas:BrunoFernandes sebas:isEnrolledIn sebas:student .