Assignment 10

Exercise 1: Core Concepts

a) Write down the core parts of a case.

A case consists of a description of a past problem and a description of the belonging solution for that particular case. A case is based on an existing and real experience, and is not simulated or made up.

**b) Write down the names of the 4R process steps. Describe in your own words each process
step.**

The 4R process is a methodology of problem solving and consists of the following steps:

1. **Retrieving:** First, the case representation need to be defined, which can be attribute-value, object-oriented or other specific representations. When the structure is known, similarity measures can be found by finding similar cases (by defining similarity scores). The rertrieval can be done by use of data bases or retrieval algorithms.

2. **Reusing:** Want to reuse information from the cases found in the retrieving step. Can be done through statistical reuse, or adaptation approaches such as reuse of solution procedures, whole solutions or more overall ideas.

3. **Revising:** In this next step, the new found solution is revised to check the quality and correctness of the solution. Often this needs to be done manually through testing, and can involve modifying or make small changes to the solution.

4. **Retaining:** The last step is about learning by adding new solutions to the case base, and also updating and organizing similarity measures, attribute weigths, the overall case base etc. This can now be used for future problems, making the case base more valuable.

Exercise 2: Details of a CBR System

a) Think about an application in which CBR can be applied. Write down the task of the system.

An application for IT techincal support, where the task is to guide people with technical issues on their computer. The system aims to help people with problems by prodivding solutions from previous similar problems.

b) Write down a case representation for your example.

Attributes:

- **Computer model:** Both brand and computer model

- **Problem type:** What kind of problem the user have (different categories)

- **Error message:** Possible error message displayed if relevant

- **Provided solution:** Solution for the problem

- **Outcome:** Was the problem fixed or at least somewhat fixed by the solution provided

c) Pick at least one attribute and define a similarity function.

The **Computer model** attribute can include various elements like brand, series, and specific model number, which may influence the technical issues typically encountered. En example of a similarity function can therefore be:

similarity(Brand, Model, Type) =

- 1 if all parameters are equal

- 0.75 if only brand and type is equal (e.g Asus gaming laptop)

- 0.25 if only the category is equal

- 0 if none of the parameters are equal

Exercise 3: Knowledge Representation

Draw a table that shows the relationship between the 4R cycle and the knowledge containers.

4R cycle	Knowledge containers	Relationship
Retrieving	Vocabulary, Similarity Measures	**Vocabulary:** helps define the terms and structures used in cases. **Similarity measures:** are used to find relevant cases based on how similar they are to the new problem.
Reusing	Case Base, Adaption knowledge	**Case Base**: provides the actual cases from which solutions are reused. **Adaptation Knowledge**: used to apply and adjust the retrieved solutions to the new problem context.
Revising	Adaptation Knowledge	**Adaptation Knowledge**: crucial for modifying and fine-tuning the reused solutions to better solve the new problem.
Retaining	Case Base	**Case Base:** is updated with new cases or modifications to existing cases.