Assignment 1:

**Q1:** Discuss the limitations of expert systems in modeling human performance.

1. They struggle to capture “deep” knowledge of the problem domain. For example, MYCIN doesn’t actually understand human physiology, as it asked whether the patient was pregnant or not after being told the patient was male.
2. They lack robustness and flexibility. If an expert system is presented with a problem they are not immediately capable of solving, they generally lack the ability to do so at all.
3. Expert systems cannot provide deep explanations. They only understand the steps they took to solve the problem and usually nothing else, for example why they used a certain or approach or how it was effective.
4. It is very difficult to verify the correctness of expert systems.
5. Expert systems do not generally improve or learn. Once they are completed and implemented their performance will stagnate without further input from their developers.

**Q2:** Determine if there is equivalence or not between (¬P → ¬Q) and (P ∨ ¬Q). Use truth tables to explain your answer.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **P’** | **Q’** | **P’->Q’** |
| **T** | **T** | **F** | **F** | **T** |
| **T** | **F** | **F** | **T** | **T** |
| **F** | **T** | **T** | **F** | **F** |
| **F** | **F** | **T** | **T** | **T** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **P’** | **Q’** | **P V Q’** |
| **T** | **T** | **F** | **F** | **T** |
| **T** | **F** | **F** | **T** | **T** |
| **F** | **T** | **T** | **F** | **F** |
| **F** | **F** | **T** | **T** | **T** |

The 2 expressions are the same as their truth tables are equivalent.

**Q3:** Consider the following pair of expressions:

lives\_in(X, athabasca\_town, works\_in(X, athabasca\_university))

lives\_in(karen, Y, works\_in(X, Z))

Try to unify this pair of expressions; then either show the most general unifier or explain why they will not unify.

The most general unifier is [X/Karen, Y/Athabasca\_Town, Z/Athabasca\_University] by Martelli – Montanari algorithm