UNIVERSITY OF CALIFORNIA, MERCED

BERKELEY · DAVIS · IRVINE · LOS ANGELES · MERCED · RIVERSIDE · SAN DIEGO · SAN FRANCISCO

SANTA BARBARA · SANTA CRUZ

CSE 15: Discrete Mathematics
Homework 2

Spring 2019

Introduction

This assignment will give you practice in translating English sentences into propositional logic, also known as knowledge representation. As always, you will also be practicing your LaTeX skills

Exercises

Create a new LaTeX document and type out the solutions to the following exercises. Your document should include an appropriate title, your name, as well as a date. Please number your solutions appropriately. Upload your `.tex` and your `.pdf` files under the relevant CatCourses assignment.

Represent the following sentences in propositional logic. State the meaning of all propositional variables you have chosen, and use the logical connectives appropriately.

Example Translate the sencence "The sun is hot and the ocean is wet" into propositional logic.

Solution Let $p = \mathsf{The\ sun\ is\ hot}$, and let $q = \mathsf{The\ ocean\ is\ wet}$, then $p \wedge q$

Knowledge Representation

1. It is not cloudy and it is not raining.
2. I like to eat apples and bananas.
3. Behind the clouds the sun is shining.
4. If a function is differentiable then the function is continuous.
5. I will study for the final otherwise I will fail.

Equivalence in Propositional Logic

Determine whether the following pairs of propositions are equivalent to each other. If they are not equivalent, explain why. If they are equivalent, provide a proof.

1. $p \wedge q$ and $p \vee \neg q$
2. $p \vee q$ and $\neg p \vee \neg q$
3. $p \rightarrow q$ and $\neg q \rightarrow \neg p$
4. $p \rightarrow q$ and $\neg p \vee q$
5. $\neg(p \wedge q)$ and $\neg p \vee \neg q$