

Discrete Structures and Theory (Spring 2023)

Homework 4

Deadline: 17/02/2023

1. (3 POINTS) Let $C(x, y)$ mean that student x is enrolled in class y , where the domain for x consists of all students in your school and the domain for y consists of all classes being given at your school. Express each of these statements by a simple English sentence.
 - a) $C(\text{Randy Goldberg}, \text{CS 252})$
 - b) $\exists y C(\text{Carol Sitea}, y)$
 - c) $\exists x (C(x, \text{Math 222}) \wedge C(x, \text{CS 252}))$
 - d) $\exists x \forall y ((x \neq \text{Mary Black}) \wedge (C(\text{Mary Black}, y) \rightarrow C(x, y)))$

2. (6 POINTS) Express each of these statements using predicates with two variables and nested quantifiers. Then form the negation of the statement so that no negation is to the left of a quantifier. Next, express the negation in simple English. (Do not simply use the phrase “It is not the case that.”)
 - a) Someone in this class has visited every country in the world.
 - b) No one has climbed every mountain in the Himalayas.
 - c) Every faculty member at your school has mentored a child from Berekuso Basic School.

3. (4 POINTS) Use rules of inference to show that the hypotheses “Maria is not cooking or she is hungry”, “If Maria is hungry then she will not go jogging”, and “Maria is cooking or she will not go jogging” imply that “Maria will not go jogging”.