Assignment 1

Your Full Name
Your Student ID

February 27, 2025

Abstract

Course: SOEN 331
Instructor: Dr. Constantinos Constantinides
Due Date: Tuesday, 4 March 2025 (23:59)
Weight: 10% of the overall grade

General information

Introduction and ground rules

1 Problem 1: Propositional Logic (7 pts)

1.1 Statement by Sophia the robot (3 pts)

1.2 Argument from "Computing Machinery and Intelligence" (4 pts)

2 Problem 2: Predicate Logic (8 pts)

2.1 Interpreting given formalizations (4 pts)

2.2 Formalizing statements (4 pts)

3 Problem 3: Linear Temporal Logic 1 (15 pts)

3.1 Requirement "if exactly one of , becomes invariant..." (3 pts)

3.2 Requirement "if and differ at time $= i$..." (3 pts)

3.3 Describing and visualizing $\neg(\neg \ \neg) \to \Box \ \Box$ (3 pts)

3.4 Describing and visualizing $\Box \ \Box \ (\ ) \to \Box\Box \ (\ R\ )$ (3 pts)

3.5 Describing and visualizing $\Box(\ ) \to \ (\ U\ )$ (3 pts)

4 Problem 4: Linear Temporal Logic 2 (15 pts)

4.1 Visualizing all models of behavior (9 pts)

4.2 Mathematical structures (4 pts)

4.3 Observations on termination, non-termination, consistency (2 pts)

5 Problem 5: Unordered Structures (10 pts)

6 Problem 6: Ordered Structures (10 pts)

6.1 Implementing a Queue using two lists (4 pts)

6.2 Defining Enqueue and Dequeue operations (6 pts)

7 Problem 7: Binary Relations, Functions, and Orderings (15 pts)

7.1 Poset proofs and Hasse diagrams (3 pts total)

7.2 Analyzing variable map (12 pts total)

8 Problem 8: Binary Relations, Functions, and Orderings 2 (10 pts)

8.1 Is map2 a function, domain, codomain (2 pts)

8.2 Properties analysis (8 pts)

9 Problem 9: Construction Techniques (10 pts)

9.1 Function `map`(f, Λ) **(5 pts)**

9.2 Function `insert`(x,Λ) **(5 pts)**

What to submit