CSE 380 **Discrete Mathematics II**

Ponder and Prove Partial Orders and Posets

25 January 2021 *and Self-Assess*

Read and Relate

Read the next 3 pages of the Fast Flow Analysis with Gödel Hashes paper, that is, pages 5, 6, and 7 (up to but not including section VI).

Relate what you read in this paper about partial orders and posets to what you learn this week about these special types of relations and their applications.

Understand and Write

Understand the techniques of construction of the standard set-theoretic operations and relations out of arithmetic. Quoting from page 3:

> On the Gödel hash of a set, familiar number-theoretic operations become set-theoretic operations: modulo tests both membership and subset-inclusion; union becomes least common multiple; and intersection becomes greatest-common divisor.

Understand also how relations can be encoded as sets of pairs.

Write python code to enhance your understanding of these encodings and constructions.

TODO What Is True?

Assess yourself on how you did using the "Multiple Answer" questions on this quiz.

What is true of my experience in general?

- ☐ I had fun.
- ☐ I learned something new.
- ☐ I achieved something meaningful, or something I can build upon at a later time.

What is true of my report on what I learned?

- ☐ I wrote a sufficient number of well-written sentences.
- ☐ My report is free of "mechanical infelicities" (misspelled words, grammatical errors, punctuation errors, etc.).
- ☐ I reported on any connections I found between this investigation and something I already know.
- ☐ I reported who were and what contribution each of my collaborators made.

What is true about the correctness and completeness of my code?

- ☐ It correctly calculates set membership.
- ☐ It correctly calculates subset-inclusion.
- ☐ It correctly calculates set union.
- ☐ It correctly calculates set intersection.
- ☐ It correctly encodes relations as sets of pairs.

What is true about the elegance of my code?

- ☐ It has some by virtue of its correctness, as first and foremost, an elegant solution is a correct solution.
- ☐ It increases by means of helper functions that increase cohesion, and decrease complexity.
- ☐ It increases by having no unnecessary, redundant functionality.
- ☐ It increases by using data types/structures as efficiently as possible.

What is true of the depth of my engagement with this assignment?

- ☐ Even if I have not yet taken Algorithms and Complexity (CSE 381) I tried to understand what the paper says about the space efficiency and the time efficiency of the operations on Gödel hashes for sets.

☐ I researched and learned what it means for a poset to have a *prime basis*.

☐ I researched lattices so as to better understand Section V, especially where it talks about promoting a partial order to a lattice.